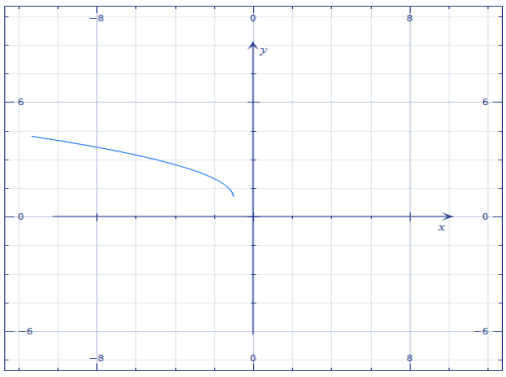
King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (002)-Term (153)
Recitation (4.1)

Question 1: If the graph given below represent $f(x)$, then graph of the function $y = f^{-1}(-x)$ *lies completely in*:



(a) Quadrant I

(b) Quadrant II

(c) Quadrant III

(d) Quadrant IV

(e) Quadrant I and II

Question 2: Which one of following functions has an inverse?

(a) $f(x) = x^2 + 5$

(b) $f(x) = |x + 1| - 2, \quad x \geq -2$

(c) $f(x) = \sqrt{1 - x^2}$

(d) $f(x) = (x + 3)^2 - 5\,, x \geq -3$

(e) $f(x) = -x^2 + 4, \; x \leq 1$

Question 3: For the following functions, find $f^{-1}(x)$ and state its domain and range

(a) If $f(x) = -\sqrt{4 - x^2}$ for $-2 \leq x \leq 0$

(b) If $f(x) = -2 + \sqrt{2 - x}$ for $x \leq 2$

(c) If $f(x) = \frac{2x+3}{x-1}$

Question 4: If $f(x) = -x^2 + 4x,\ x \leq 2,\ then\ \ f^{-1}(x)$ is

(a) $y = 2 \pm \sqrt{4-x}\,, x \leq 4$

(b) $y = 2 - \sqrt{x-4}\,, x \geq 4$

(c) $y = 2 - \sqrt{4-x}\,, x \leq 4$

(d) $y = 2 + \sqrt{4-x}\,, x \leq 4$

(e) $y = 2 + \sqrt{x-4}\,, x \geq 4$

Question 5: Let $f(x) = \frac{3x-k}{x-2}$ and $f^{-1}(x)$ exists. If $f^{-1}(-2) = 1$, then the value of $(fof)(1) + (f^{-1}of)(5) - f^{-1}(4)$ is

(a) $\frac{1}{4}$

(b) $-\frac{1}{4}$

(c) 5

(d) $\frac{7}{4}$

(e) $\frac{55}{4}$

Question 6: If $f(x) = ax + 1\ \ and\ \ g(x) = 2x + b,\ where\ a, b\ \in R, a \neq 0$ are inverses of each other then find $a + b$.

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (002)-Term (153)
Recitation (4.2)

Question 1: If the function $y = 4^{x+2} - 5$ is written as $y = k\left(\frac{1}{2}\right)^{bx} + c$, then $k + b + c =$

(a) 11 (b) 7 (c) 9 (d) 13 (e) 12

Question 2: Find the intersection points of the graphs of

$y = \left(\frac{1}{3}\right)^{2x+5}$ *and* $y = 27$

Question 3: If (a, 0) and (0, b) are the **x** any **y** intercepts of the graph $y = \left(\sqrt[3]{5}\right)^{-x} + c$ with horizontal asymptote $y = -\frac{1}{5}$ then $b - a =$

(a) 4/5
(b) 3
(c) 5/2
(d) $-11/5$
(e) 19/5

Question 4: For $f(x) = 2(2^{-|x|}) - 1$

(a) Graph f

(b) Write down the asymptote and range of f

(c) Find the intervals for which the graph of f is below x-axis.

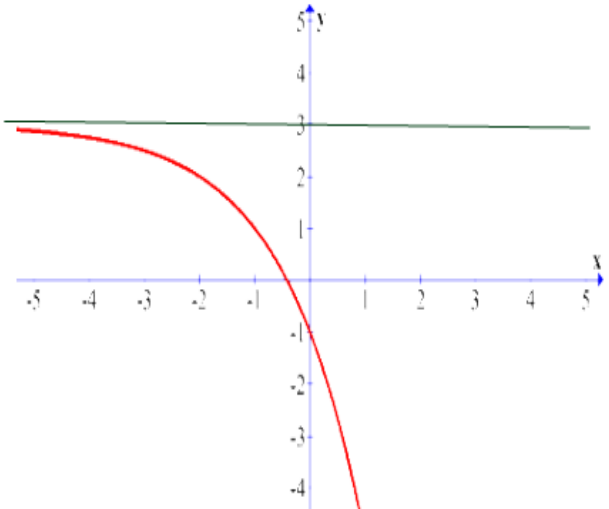
Question 5: The adjacent figure represents the graph of:

(a) $y = -\left(\frac{1}{2}\right)^{x+2} + 3$

(b) $y = \left(\frac{1}{2}\right)^{x+2} - 3$

(c) $y = -(2)^{x+2} + 3$

(d) $y = (2)^x + 3$



(e) $y = (2)^{x-2} + 3$

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (002)-Term (153)
Recitation (4.3)

Question 1: If $\log_{10} 2 = 0.30,\ \log_{10} 3 = 0.48,\ \ then\ \ \log_{10}\left(\frac{9}{25}\right) =$

(a) -0.24 (b) -0.44 (c) 0.36 (d) -0.32 (e) -0.28

Question 2: Find the value of (a) $\log_{1/2} \sqrt[3]{32} + \log_3 \frac{1}{\sqrt{27}}$ (b) $(\frac{1}{25})^{1-2\log_5 2}$

Question 3: Write $3 - 2\log_2 x - \frac{1}{2}\log_2 y,\ where\ x > 0, y > 0$ as a single logarithmic expression term.

Question 4: From the graph of $y = \log_{1/2} x$, solve the inequalities (a) $\log_{1/2} x > 1$ (b) $\log_{1/2} x < -2$

Question 5: Find the domain of $y = \log_2\left(\frac{|x-3|}{x^2+x-2}\right)$

Question 6: The graph of $y = \log_3|x-3| - 1$ is below the x-axis on the intervals

(a) $(2,\ 3) \cup (3,\ 4)$

(b) $(-\infty,\ 0) \cup (6,\ \infty)$

(c) $(-1,\ 0) \cup (0,\ 1)$

(d) $(0,\ 3) \cup (3,\ 6)$

(e) $(-\infty,\ 2) \cup (3,\ \infty)$

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (002)-Term (153)
Recitation (4.4)

Question 1: If $\log 2 = c$, *then* $\log_8 \sqrt[3]{10} =$

(a) $\frac{1}{9c}$ (b) $\frac{2}{3c}$ (c) $\frac{c}{9}$ (d) $\frac{1}{c}$

(e) $\frac{3c}{2}$

Question 2: Find the value of $(\log_5 20)(\log_{20} 60)(\log_{60} 100)(\log_{100} 125)$

Question 3: Which one of the following statement is false?

(a) $\ln(\log 10) = 0$

(b) $\log(\ln e^{100}) = 2$

(c) $\frac{1+\ln x}{-3\ln(\frac{1}{2})} = \log_8(ex), \quad x > 0$

(d) $e^{(3\ln 2 + 2\ln 3)} = 72$

(e) $\ln(x^2 - 4) = \ln(x-2) + \ln(x+2)$, *where* $x < -2$ *or* $x > 2$

Question 4: If $a > 0,\ a \neq 1,\ x > 0, x \neq 1,$ then simplify the expression

$(\log_{\sqrt{10}} 1000)(\log_a \sqrt{x})(\log_{x^3} a)$

Question 5: Write the expression as a single logarithmic term with base **e**:

$$3\ln x - \frac{\ln(x-3)}{2} + \log_{\sqrt{e}}(x+1) - 4, \qquad \textit{where } x > 3$$

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (002)-Term (153)
Recitation (4.5)

Question 1: The sum of all solutions to the equation $\log_2 \sqrt{x} = \sqrt{\log_2 x}$ is

(a) 10 (b) 17 (c) 21 (d) 24
(e) 12

Question 2: The number of solutions of the equation $\log(x^3) = (\log x)^2 + 2$ is equal to:

(a) 2 (b) 3 (c) 1 (d) 0
(e) 4

Question 3: The solution set of the equation $\log \sqrt[3]{x^2 - 15x} = \frac{2}{3}$ consists of:

(a) one positive and one negative integers
(b) two positive integers
(c) one positive integer only
(d) two non-integer rational numbers
(e) one negative integer only

Question 4: The equation $\log(x + 4) = 1 - \log(x - 5)$ has

(a) two positive real solutions
(b) only one negative real solution
(c) two negative real solutions
(d) one positive and one negative real solutions
(e) only one positive real solution

Question 5: Solve the following equations

(a) $(\ln x)^2 + e^{\ln(-\ln x)} - 6 \ln e^2 = 0$

(b) $\frac{1 - e^x}{2e^{-x} - 2} = \frac{3}{2}$

(c) $2^x - 2^{3-x} = 7$

(d) $\frac{4^x+4^{-x}}{4^x-4^{-x}}=3$

King Fahd University of Petroleum and Minerals
Prep -Year Math Program
Math 002 - Term 153
Recitation (5.1)

Question1.

If α is of the complement of the angle 30.56° and β is the supplement of the angle $40^\circ\ 51'\ 27''$, then find the smallest positive angle coterminal with the angle $\beta-\alpha$ and write it as DMS.

Question2.

a) Give two positive and two negative angles that are coterminal with 41°.

b) Find all coterminal angles of 65°.

Question3.

If $\alpha=675^\circ$ and $\theta=-\frac{11\pi}{6}$ are two angles in standard position, then find the quadrant of $2\alpha+\theta$.

Question4

A hard disk in a computer rotates at 300 revolutions per minute. Through how many degrees does a point on the edge of the disk move in 3 seconds?

A) 7200°

B) 6400°

C) 10800°

D) 5400°

E) 1800°

Question5

In a right triangle, one angle is $31^\circ\ 42'\ 17''$, the other acute angle is:

A) $58^\circ\ 17'\ 43''$

B) $58^\circ\ 42'\ 17''$

C) $148^\circ\ 17'\ 43''$

D) $58^\circ\ 37'\ 48''$

E) $59^\circ\ 18'\ 43''$

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math 002 - Term 153
Recitation (5.2)

Question1:

Let θ be an acute angle satisfying $4\sin\theta = 5\cos\theta$, then find the six trigonometric function values of the angle θ.

Question2:

If the terminal side of the angle θ in the standard position coincides with the line $3x + 2y = 0$, with $x \le 0$, then find $\sec\theta$.

Question3:

Which of the following statement is possible?

a) $\csc\theta = 0$

b) $\cos\theta = \frac{\pi}{2}$

c) $\sec\theta = \frac{1}{2}$ and $\cos\theta = 2$

d) $\tan\theta = \frac{2}{3}$; $\sin\theta = 2$ and $\cos\theta = 3$

e) $\tan\theta = -\sqrt{3}$ and $\csc\theta = -\frac{2\sqrt{3}}{3}$

Question4:

a) If $\sin\theta = \frac{1}{3}$ and $P(-2,k)$ is a point on the terminal side of θ in standard position, then find the value of k.

Question5:

If $cot^2\theta = 16$ and θ terminates in the third quadrant, then $\sec\theta =$

A) $\sqrt{17}$ B) $\frac{\sqrt{17}}{4}$ C) $-\frac{\sqrt{17}}{4}$ D) $-\frac{4}{\sqrt{17}}$ E) $-\sqrt{17}$

Question6:

If $\tan(37^\circ) = t$, then $\tan 863^\circ + \tan 307^\circ =$

A) zero B) $\frac{t^2+1}{t}$ C) $-\frac{(t^2+1)}{t}$

D) $\frac{(t^2-1)}{t}$ E) $\frac{(1-t^2)}{t}$

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math 002 - Term 153
Recitation (5.3)

Question1:

If α is the reference angle of 675° and β is the least positive coterminal angle of -240°, then find $\alpha + \beta$.

Question2:

Find all values of θ that has the given function value, if θ in the interval $[0^\circ, 360^\circ)$.

a) $\cos\theta = -\frac{\sqrt{2}}{2}$ b) $\sin\theta = \frac{\sqrt{3}}{2}$ c) $\tan\theta = -1$ d) $sec^2\theta = 2$

Question3:

Find the equation of the straight line passing through the origin and making an angle of 60° with positive direction of the x-axis.

Question4:

Find the angle between the line $x + y = -3$ and the positive x-axis.

Question5:

Find the exact value of the following expressions:

a) $\csc(570^\circ)\sec(-480^\circ) + \tan(65^\circ) + \cot(155^\circ)$

b) $4\sin(-510^\circ)\cos(300^\circ) + \cot(199^\circ) - \tan(251^\circ)$

Question6:

If $\tan 53^\circ = b$, then $csc^2(37^\circ) + 1 =$

A) $b^2 + 1$

B) b^2

C) $b^2 - 1$

D) $\frac{b^2+1}{b^2}$

E) $b^2 + 2$

Question7:

If $-45^\circ < \theta < 45^\circ$, then

a) $\sin(\theta + 45^\circ) < 0$ and $\sec\frac{\theta}{2} > 0$

b) $\sin(\theta + 45^\circ) > 0$ and $\sec\frac{\theta}{2} < 0$

c) $\sin(\theta + 45^\circ) > 0$ and $\sec\frac{\theta}{2} > 0$

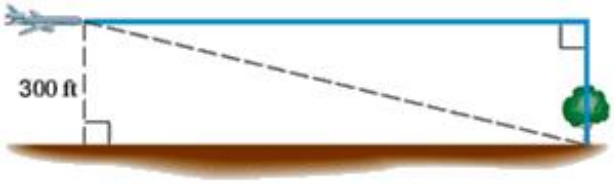
d) $\sin(\theta + 45^\circ) < 0$ and $\sec\frac{\theta}{2} < 0$

e) $\tan\theta < 0$ and $\cos\theta > 0$

King Fahd University of Petroleum and Minerals
Prep -Year Math Program
Math 002 - Term 153
Recitation (5.4)

Question1

An airplane is flying 300 feet above the groundlevel. If the angle of depression from the plane to the base of a tree is 30°, then the horizontal distance the plane must fly to be directly over the tree is



Question2

From a given point on the ground, a man finds the angle of elevation to the top of a tree is equal to 60°. He moves back 50 ft and finds the angle of elevation to the top of the tree is equal to 30°. Find the height of the tree.

Question3

The angle of elevation from the top of a small building to the top of a taller building is 60°, while the angle of depression to the bottom is 30°. If the shorter building is 30 m high, then the height of the taller building is

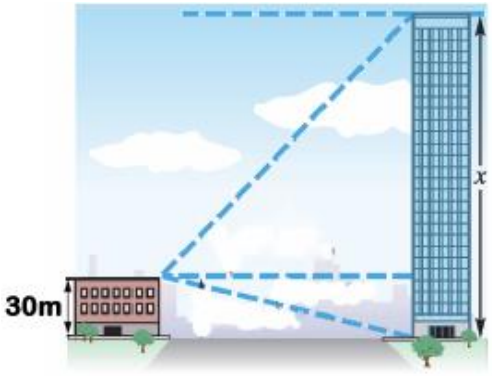
A) $\left(30+60\sqrt{3}\right)\text{m}$

B) $150\,\text{m}$

C) $100\sqrt{3}\,\text{m}$

D) $120\,\text{m}$

E) $90\sqrt{3}\,\text{m}$



Question4

If from the top of a tower 200 feet high, the angles of depression of the top and bottom of a building opposite to the tower are observed to be 30° and 60°, respectively, then the height of the building is

A) $\frac{200\sqrt{3}}{3}$

B) $\frac{400}{3}$

C) $100\sqrt{3}$

D) $\frac{350}{3}$

E) $\frac{400\sqrt{3}}{3}$

King Fahd University of Petroleum and Minerals
Prep -Year Math Program
Math 002 - Term 153
Recitation (6.1)

Question1

If α is the least negative angle with coterminal angle of measure $\frac{39\pi}{4}$ and β is the reference angle of the angle of measure 30 radian, then find $\alpha + \beta$.

Question2

Find the length of an arc that subtends a central angle of $40^\circ\, 15'$ in a circle of circumference 30π cm.

Question3

If the arc length $\frac{4\pi}{3}\ cm$ subtends a central angle θ in a circle with diameter $12\ cm$, find the degree measure of the angle θ.

Question4

A rope is being wound around a drum of radius $5\ ft$. How much rope will be wound if the drum is rotated through an angle of 120°.

Question5

The radian measure of the reference angle of -2560° is

A) $\frac{16\pi}{9}$

B) $-\frac{2\pi}{9}$

C) $\frac{5\pi}{18}$

D) $\frac{2\pi}{9}$

Question6

If a point P lies on a circle of center O(0,0) and radius 4 units and the radius OP makes an angle of $\frac{\pi}{4}$ with x-axis, then the coordinates of P =

A) $(1, \sqrt{2})$ B) (4, 4) C) $(2\sqrt{2}, 2\sqrt{2})$

D) $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ E) $(\sqrt{2}, \sqrt{2})$

King Fahd University of Petroleum and Minerals
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Recitation (6.2)

Question1:

Find the exact value of the following:

1) $\cos\left(\frac{-7\pi}{6}\right) + \sin\left(\frac{17\pi}{3}\right) + 3\tan\left(\frac{5\pi}{4}\right)$

2) $\csc(5\pi)$

3) $2\sin\left(\frac{19\pi}{6}\right) - \cos(660^\circ)\tan\left(\frac{39\pi}{4}\right) + \sec\left(\frac{-71\pi}{6}\right)$.

Question2

The Earth revolves on its axis once every 24 hr and its radius is 6.371 km. Find the linear speed of the earth.

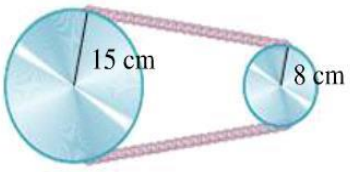
Question3

Each tire of a car has a radius of 40 cm. If the tires are rotating at 500 revolutions per minute, find the speed of the car in kilometers per hour.

Question4

Two pulleys in the figure have radii of 15cm and 8 cm respectively. If the larger pulley rotates 50 times in a minute, then the angular speed of the smaller pulley in radians per second is

A) $\frac{75\pi}{4}$ B) $\frac{25\pi}{8}$ C) $\frac{75\pi}{8}$ D) $\frac{25\pi}{4}$ E) $\frac{375\pi}{2}$



Question5

$Cos(20) =$

A) $-\cos(20 - 6\pi)$

B) $\cos 70$

C) $-\cos 70$

D) $\cos(20 - 6\pi)$

E) $\sin(20 - 6\pi)$

King Fahd University of Petroleum and Minerals
Prep -Year Math Program
Math 002 - Term 153
Recitation (6.3)

Question1:

a) Find the intervals in which the function $f(x) = -|cos\pi x|$ is increasing and decreasing in the interval $[0,4]$.

b) Find the highest point of the function $f(x) = -\frac{1}{5}\cos\left(\frac{\pi x}{2}\right)$ in the interval $[0,4]$.

Question2:

a) For $-3\pi \leq x \leq 3\pi$, find the interval in which the function $f(x) = -\frac{3}{2}\cos\frac{x}{3}$ is above the x-axis.

b) Find the number of intersection points of the graphs of $y = -|\sin \pi x|$ and $y = -\frac{1}{2}$ over the interval $\left[\frac{1}{2}, \frac{3}{4}\right]$.

Question3:

If $cos3 = a$ and $sin3 = b$, then $a - b =$

A) a positive real number.

B) a negative real number.

C) zero.

D) undefined.

Question4:

The number of zeros of the function $f(x) = -2\sin\frac{4x}{3}$ in the interval $\left[-\frac{3\pi}{2}, \frac{3\pi}{2}\right]$ is:

A) 1

B) 2

C) 3

D) 4

E) 5

King Fahd University of Petroleum and Minerals
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Recitation (6.4)

Question1:

If P and F are the period and the phase shift respectively and $R = [a, b]$ is the range of the graph of $y = -1 + \frac{1}{4}\cos(3x - 2\pi)$, then find $P - F + a + b$

Question2:

Find the number of x-intercepts of the function $f(x) = 1 + \sqrt{2}\sin\left(\frac{x}{2} + \pi\right)$ in the interval $(-4\pi, 0)$.

Question3:

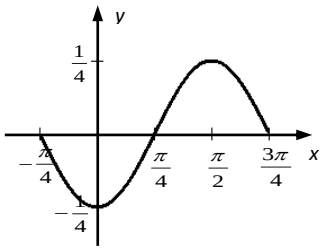
If A is the amplitude, P is the period, M is the maximum value and m is the minimum value of the function $f(x) = -3\sin(2\pi x - 1) + 5$, then $\frac{A+P}{M+m} =$

A) 3 B) $\frac{3}{5}$ C) $\frac{11}{10}$ D) $\frac{7}{10}$ E) $\frac{9}{5}$

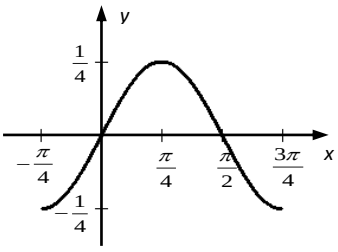
Question4:

Which one of the following is the graph of $y = \frac{1}{4}\cos 2\left(x + \frac{\pi}{4}\right)$ over one period?

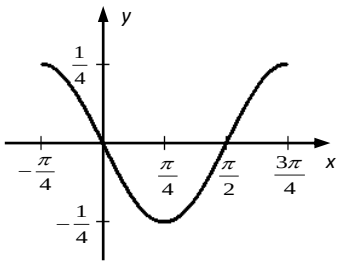
a)



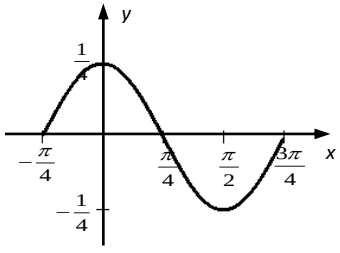
b)



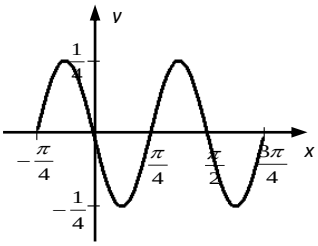
c)



d



e)



King Fahd University of Petroleum and Minerals
Prep -Year Math Program
Math 002 - Term 153
Recitation (6.5)

Question1:

Find the interval(s) in which the function $y = \tan|x|$, $-\frac{3\pi}{2} \le x \le \frac{3\pi}{2}$, is above the x-axis.

Question2:

a) Find all vertical asymptotes of the graph of $y = 3\tan\left(\frac{x}{3} - \frac{\pi}{6}\right)$, for $-6\pi \le x \le 6\pi$.

b) Find the number of vertical asymptotes of the graph of the function $y = \frac{1}{2}cot(2x - 3\pi)$ in the interval $\left[\frac{\pi}{4}, \frac{7\pi}{4}\right]$.

Question3:

Find the interval(s) in which the function $y = -2\tan\left(3x + \frac{\pi}{4}\right)$ is increasing, where $-\frac{3\pi}{4} \le x \le \frac{7\pi}{12}$.

Question4:

The intersection point(s) between the graph of $y = \cot(2x + \frac{\pi}{3})$ and the x-axis over the interval $\left(\frac{\pi}{12}, \frac{4\pi}{3}\right)$:

A) $\frac{7\pi}{12}$ B) $\frac{13\pi}{12}$ C) $\frac{\pi}{12}, \frac{7\pi}{12}$ D) $\frac{7\pi}{12}, \frac{13\pi}{12}$ E) $\frac{\pi}{12}, \frac{13\pi}{12}$

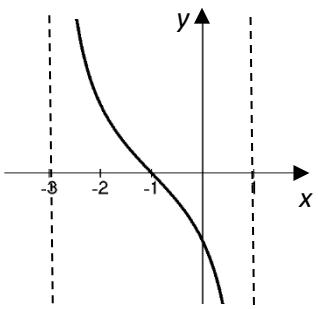
Question5:

The graph below can be represented by the trigonometric function

A) $f(x) = -2\tan\left(\frac{\pi}{4}x + \frac{\pi}{4}\right)$ B) $f(x) = 2\tan\left(\frac{\pi}{4}x + \frac{\pi}{4}\right)$

C) $f(x) = 2\cot\left(\frac{\pi}{4}x + 1\right)$ D) $f(x) = -2\tan(x + 1)$

E) $f(x) = 2\cot(x + 1)$



King Fahd University of Petroleum and Minerals
Prep -Year Math Program
Math 002 - Term 153
Recitation (6.6)

Question1

Find the range of the function $y = 2 - 3\csc(\frac{\pi}{2}x + 4)$?

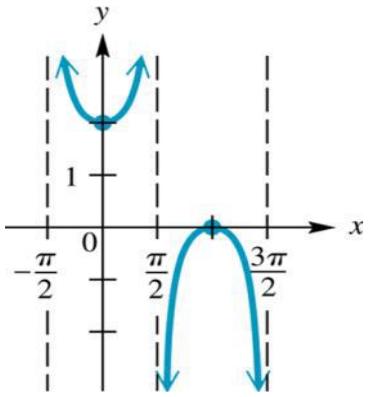
Question2

Find the number of the intersection points of the graph of $y = \left|3sec\frac{2x}{3}\right|$ and the line

$y = 4$ over the interval $[0, \frac{9\pi}{4}]$?

Question3

Write a function for the given graph



Question4

For $\frac{\pi}{2} \leq x \leq \frac{9\pi}{2}$, the graph of the function $y = \csc\left(\frac{x}{2} - \frac{\pi}{4}\right)$ is decreasing in the interval(s)

a) $\left(\frac{3\pi}{2}, \frac{5\pi}{2}\right) \cup \left(\frac{5\pi}{2}, \frac{7\pi}{2}\right)$ b) $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right) \cup \left(\frac{7\pi}{2}, \frac{9\pi}{2}\right)$

c) $\left(\frac{\pi}{2}, \frac{5\pi}{2}\right)$

d) $\left(\frac{5\pi}{2}, \frac{9\pi}{2}\right)$ e) $\left(\frac{\pi}{2}, \frac{9\pi}{2}\right)$

Question5

The graph of the function $y = -\sec(2x + \pi) + 2$, where $\frac{-3\pi}{4} \leq x \leq \frac{3\pi}{4}$ has

a) three x-intercepts b) three vertical asymptotes c) one y -intercept

d) two vertical asymptotes e) four x -intercepts

Question6

How many intersection points are there between

a) The graph of $y = secx$ and the line $y = 0$.
b) The graph of $y = secx$ +1 and the line $y = 0$.

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Recitation (7.1)

Question1

If $A = 2\sin^2 2x + 2\cos^2 2x$ and $B = 3[\sec^2(-x) - \tan^2(-x)]$, find $A + B$?

Question2

Find the value of $cos44^\circ - sin134^\circ$?

Question3

Writing $cotx$ in terms of $cosx$, where $\pi < x < \frac{3\pi}{2}$, we get $cotx =$

a) $-\frac{cosx}{\sqrt{1-cos^2 x}}$ b) $\frac{cosx}{\sqrt{1-cos^2 x}}$ c) $\frac{cosx}{\sqrt{cos^2 x-1}}$

d) $\frac{\sqrt{1-cos^2 x}}{cosx}$ e) $-\frac{\sqrt{1-cos^2 x}}{cosx}$

Question4

$sec^2 x(1 + sinx)^2 =$

a) $\frac{secx\ cscx+1}{secx\ cscx-1}$ b) $\frac{secx+cscx}{secx+cscx}$ c) $\frac{cscx+1}{cscx-1}$

d) $\frac{1}{cscx-1}$ e) $\frac{cscx+1}{cscx}$

Question5

If $sec\theta = \frac{x+4}{x}$, then $csc\theta =$

a) $\pm\frac{(x+4)\sqrt{2x+4}}{4(x+2)}$ b) $\pm\frac{(x+4)\sqrt{x+2}}{8(x+2)}$ c) $\pm\frac{\sqrt{2x+4}}{(x+4)}$

d) $\pm\frac{(x+4)\sqrt{x+2}}{2x+4}$ e) $\pm\frac{2\sqrt{x+2}}{x+4}$

Question6

Which one of the following is **NOT** an identity

a. $tan^2(-x) - cos^2(x) - sin^2(-x) = 2 - sec^2x$

b. $\frac{secx}{cscx} = tanx$

c. $tanx + cotx = secx\,cscx$

d. $tan^2x + sin^2x + cos^2x = sec^2x$

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Recitation (7.2)

Question1

If $\frac{\sin x+\csc x\ \cos^2 x+1}{\sec x\ \csc x-\tan x} = A\ \sec x + B\ \tan x$, find the value of $A + B$?

Question2

Simplify: $\frac{\frac{1}{\cos x}+\sec x}{\frac{1}{\cos x}-\cos x}$

Question3

Verify $\frac{\cos x\ \sec x+2\ \cos x-\sec x-2}{\sec x+2} = \cos x - 1$

Question4

If $\sin^4 x - \cos^4 x = m\ \sin^2 x + n$, find $2mn$?

Question5

If $A = (\sin x + \csc x)^2, B = (\cos x + \sec x)^2$ and $C = -\tan^2 x - \cot^2 x - 2$.
Then $A + B + C =$

a) 5 b) 1 c) 7 d) -5 e) -1

Question6

If $\alpha = \frac{\sin\theta}{1-\cot\theta}$ and $\beta = \frac{\cos\theta}{1-\tan\theta}$ then $\alpha+\beta=$

a) $\sin\theta + \cos\theta$ b) $\sin\theta - \cos\theta$ c) $\sec\theta + \csc\theta$
d) $\sec\theta - \csc\theta$ e) $\tan\theta + \cot\theta$

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Recitation (7.3)

Question1

Find the value of

a) $\sin(-15^{\circ})$ b) $cos(\frac{13\pi}{12})$ c) $tan(\frac{17\pi}{12})$

Question2

Find one value of θ that satisfies: $\tan(3\theta + 10^{\circ}) = \cot(2\theta - 20^{\circ})$?

Question3

Find the values of

a) $\frac{\sin 105^{\circ}}{\cos 165^{\circ}}$ b) $\frac{\tan 70^{\circ} + \cot 10^{\circ}}{1 - \tan 80^{\circ} \cot 20^{\circ}}$

Question4

If $cos^4 x = acos4x + bcos2x + c$, find $a + b + c$?

Question5

If D is the distance between the two points $P(cosx, sinx)$ and $Q(cos2x, sin2x)$, then $D^2 =$

a) $2 + 2cosx$ b) $2 - 2cosx$ c) $-2 + 2cosx$

d) $-2 - 2cos3x$ e) $2 - 2cos3x$

Question6

If α and β are two angles in the standard position with

$sin\alpha = \frac{4}{5}$, $\frac{\pi}{2} < \alpha < \pi$ and $cos\beta = \frac{-5}{13}$, $\pi < \beta < \frac{3\pi}{2}$

Then the terminal side of $(\alpha + \beta)$ is in the quadrant(s)

a) I b) II c) IV d) I or II e) II or III

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Recitation (7.4)

Question1

If $A = \frac{\sin 22.5^\circ \cos 22.5^\circ}{(\cos 15^\circ + \sin 15^\circ)(\cos 15^\circ - \sin 15^\circ)}$ and $B = \cos^2 \frac{\pi}{8} - \frac{1}{2}$, find AB?

Question2

If $\frac{\sin^3 x + \cos^3 x}{\sin x + \cos x} = 1 + n \sin(mx)$, find $m + n$?

Question3

If $\cos 3x = A \cos^3 x + B \cos x$, find $2A - B$?

Question4

Find the range of the function $f(x) = 6 - 24 \sin 4x \cos 4x \sin 8x$?

Question5

If $A = \sqrt{\frac{1+\cos 320^\circ}{2}}$ and $B = \sqrt{\frac{1-\cos 320^\circ}{2}}$, then $A + B =$

a) $\cos 160^\circ - \sin 160^\circ$ b) $-\cos 160^\circ + \sin 160^\circ$

c) $\cos 160^\circ + \sin 160^\circ$ d) $-\cos 160^\circ - \sin 160^\circ$ e) 0

Question6

$\cos 13^\circ \cos 9.5^\circ - \sin 13^\circ \sin 9.5^\circ =$

a) $\frac{1}{2}\sqrt{2+\sqrt{2}}$ b) $\frac{1}{2}\sqrt{2-\sqrt{2}}$ c) $\frac{1}{2}\sqrt{\sqrt{2}-2}$

d) $\frac{-1}{2}\sqrt{2}$ e) $\frac{1}{2}\sqrt{2}$

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Recitation (7.5)

Question1

Find the exact value of

a) $\cos^{-1}(cos\frac{3\pi}{5})$ b) $\sin^{-1}(cos\frac{5\pi}{4})$ c) $\tan^{-1}(tan\frac{4\pi}{3})$ d) $\sec(\sec^{-1} 2)$

Question2

Find the exact value of $\sin^{-1}\left[sin\frac{3\pi}{5}\right] - tan\left[2\ \cos^{-1}\frac{1}{4}\right]$?

Question3

Find the range of $y = -\cos^{-1}(2-7x)+\pi$?

Question4

The function $y = 2\sin^{-1}\frac{x}{3}$ is defined when x is in the interval

a) $[-1,1]$ b) $[-2,2]$ c) $[-3,3]$ d) $[-6,6]$ e) $[-\frac{1}{3},\frac{1}{3}]$

Question5

$$\cos^{-1}(-\frac{1}{2}) + \sin^{-1}\left[sin\frac{-2\pi}{3}\right] =$$

a) π b) 0 c) $\frac{5\pi}{3}$ d) $\frac{\pi}{6}$ e) $\frac{\pi}{3}$

Question6

$$\tan[2\cos^{-1}(-\frac{4}{5})] =$$

a) $\frac{-24}{7}$ b) $\frac{-25}{24}$ c) $\frac{25}{24}$ d) $\frac{7}{24}$ e) $\frac{24}{7}$

Question7

Which one the following functions is odd, even or neither

a) $y = \sin^{-1} x$ b) $y = \cos^{-1} x$ c) $y = \tan^{-1} x$

d) $y = \cot^{-1} x$ e) $y = \sec^{-1} x$ f) $y = \csc^{-1} x$

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Recitation (7.6)

Question1

Find the number of the solutions of the equation

$2sin^3x = sinx$ in $[0^\circ, 360^\circ)$?

Question2

Find the sum of the solutions of the equation

$sin2x + \sqrt{3}\ cosx + 2sinx + \sqrt{3} = 0$ in $[0^\circ, 270^\circ)$?

Question3

The number of the solutions of the equation

$4sinx\ cosx = \sqrt{3}$ in $[0^\circ, 180^\circ)$ is

a) 4 b) 5 c) 3 d) 2 e) 1

Question4

The sum of the solutions of the equation

$sinx = cos\frac{x}{2}$ in $[0^\circ, 270^\circ)$ is

a) π b) 3π c) $\frac{4\pi}{3}$ d) $\frac{\pi}{3}$ e) $\frac{8\pi}{3}$

Question5 [Use the Reduction Identity]

The number of the solution(s) of

$\frac{1}{cscx} - \sqrt{3}\cos x = 1,\ 0 \le x < 2\pi,$ is

a) 1 b) 2 c) 3 d) 4 e) 5

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Recitation (7.7)

Question1

Find the exact value of $\csc\left[\tan^{-1}\left(\frac{4}{3}\right) - \cos^{-1}\left(\frac{12}{13}\right)\right]$?

Question2

If $u > 0$, find the exact value of $\sec\left[\cot^{-1}\frac{\sqrt{4-u^2}}{u}\right]$?

Question3

$\sin^{-1}(\frac{3}{5}) + \cos^{-1}(-\frac{4}{5}) =$

a) π b) $\frac{\pi}{2}$ c) $\frac{3\pi}{2}$ d)) $\frac{7}{5}$ e) $\frac{-1}{5}$

Question4

The sum of all solution(s) of $\sin^{-1} x + \tan^{-1} x = 0$ is

a) 0 b) 1 c) -1 d) π e) 2π

Question5

The solution of $\sin^{-1} 2x + \cos^{-1} x = \frac{\pi}{6}$ satisfies the **inequality**

a) $-1 < x < 0$
b) $0 < x < 1$
c) $1 < x < 2$
d) $-2 < x < -1$
e) $2 < x < 3$

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Recitation (8.3)

Question1

Are the vectors $\vec{u} =< 2cos85^{\circ}, 2sin85^{\circ} >$ and $\vec{v} = 3 < cos25^{\circ}, sin25^{\circ} >$ orthogonal?

Question2

Let $\vec{u} = 2i - 4j$ and $\vec{w} = 3i - 3j$

a) Find a unit vector in the opposite direction of $\vec{u}$?
b) Find a vector of magnitude 2 in the direction of $\vec{w}$?

Question3

Find the value of k such that the two vectors $\vec{u} =< 3,4 >$ and $\vec{v} =< 2,k >$ have the same direction?

Question4

If $\vec{u}$ and $\vec{v}$ are unit vectors and the angle between $\vec{u}$ and $\vec{v}$ is 120°, find $|\vec{u} - \vec{v}|$?

Question5

Let $\theta = \cos^{-1}\left(-\frac{3}{5}\right)$ be the direction angle of a vector $\vec{u}$. I f $|u| = 20$, then the vertical component of $\vec{u}$ is equal to:

a) 16 b) -16 c) 12 d) -12 e) 4

Question6

If $\vec{u} =< -2,7 >$, then a nonzero vector that is perpendicular to $\vec{u}$ is:

a) $< 14,4 >$ b) $< -1,1 >$ c) $< 2,-7 >$ d) $< 1,-1 >$ e) $< 7,-2 >$

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Recitation (9.1)

Question1

Assuming that the following system is dependent, find the sum $a + b$.

$$\begin{cases} \frac{3}{2}x - \frac{1}{3}y = \frac{b}{7} \\ \frac{a}{4}x - y = 2 \end{cases}$$

Question2

If the system of linear equations

$$\begin{cases} -4x + 4y + 3 = 0 \\ 2x - ky + 2 + k = 0 \end{cases}$$

is inconsistent, then k =

a) 2 b) 3 c) 4 d) 5 e) 6

Question3

If (a, b) is the solution of the equation $(1 + 3i)x + (5 - 2i)y = 20 + 9i,$ then ab =

a) 10 b) 12 c) -3 d) -14 e) 15

Question4

Find an equation of the parabola in the form $y = ax^2 + bx + c,$ that passes through the points $(0, -1), (1, 2)$ *and* $(3,4)$.

Question5

Solve the following system of equations

$$\begin{cases} cosx + \sqrt{3}\, sinx = 2 \\ sinx - \sqrt{3} cosx = 0 \end{cases}$$

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Recitation (9.2)

Question1

Using Gauss-Jordan Method, Solve the following linear system

$$\begin{cases} 4x - 2y + z = 13 \\ x + y + z = -2 \\ 4x + 2y + z = 1 \end{cases}$$

Question2

Show that the following linear system is inconsistent

$$\begin{cases} 5x + 3y - z = 1 \\ 4x + 3y - 2z = 1 \\ x + z = 2 \end{cases}$$

Question3

Show that the following linear system is dependent and find its all solutions

$$\begin{cases} x + 2y + z = 1 \\ 5x + 2y + 3z = 4 \\ 3x - 2y + z = 2 \end{cases}$$

Question4

Solve the following system of equations

$$\begin{cases} x - \frac{1}{y} + \frac{2}{z} = 1 \\ 3x + \frac{2}{y} + \frac{4}{z} = 4 \\ \frac{1}{y} + \frac{2}{z} = 5 \end{cases}$$

a) (0, 1 , 3) b) (1 , -1 , -2) c) (-2 , 1 , 3)

d) (-2 , 1 , ½) e) (-2 , 1/3, ½)

Question5

If the echelon form of the linear system

$$\begin{cases} x-3y+z &= 8 \\ 2x-5y-3z &= 6 \\ x-6y+7 &= 7 \end{cases}$$ is $$\left[\begin{array}{ccc|c} 1 & -3 & 1 & 8 \\ 0 & 1 & m & n \\ 0 & 0 & 1 & p \end{array}\right],$$ then (m, n, p) =

$a)\ (-5\ ,-10\ ,5)$ $b)\ (3,-6,-3)$ $c)\ (-5,10,-3)$

$d)\ (-2\ ,7,-1)$ $e)\ (-3,6,-2)$

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Recitation (9.3)

Question1

If $A = \begin{bmatrix} 2 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 1 & 6 & 2 & 2 \\ 1 & 1 & -2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & 2 & 1 \\ 3 & 0 & 1 & -1 \\ -1 & 2 & -2 & 1 \\ -3 & 2 & 3 & 2 \end{bmatrix}$, then

a) Find the sum of the cofactors of A_{23} and B_{44} .
b) Find |A| and |B| .

Question2

Evaluate the following determinants

a) $\begin{vmatrix} 3 & 5 \\ 2 & 4 \end{vmatrix}$ b) $\begin{vmatrix} 2 & 0 & 0 \\ 4 & 1 & 0 \\ 7 & 3 & -2 \end{vmatrix}$ c) $\begin{vmatrix} 3 & 0 & 0 \\ 2 & 1 & 1 \\ 1 & 2 & 2 \end{vmatrix}$

d) $\begin{vmatrix} 4 & 0 & 2 & 1 \\ 5 & 0 & 4 & 2 \\ 2 & 0 & 3 & 4 \\ 1 & 0 & 2 & 3 \end{vmatrix}$ e) $\begin{vmatrix} 5 & -13 & -3 \\ -2 & 5 & 1 \\ -2 & 6 & 2 \end{vmatrix}$

Question3

If $A = \begin{bmatrix} 4 & -1 \\ 6 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 2 \\ -2 & 2 \end{bmatrix}$, then find A^2B^3 .

Question4

Solve the equation $\det(M - xI) = 0$, given that $M = \begin{bmatrix} 2 & -1 \\ 1 & 0 \end{bmatrix}$.

a) 1 b) 2 c) 3 d) -1 e) -1/2

Question5

Using the concept of "determinant", show that the following linear system is dependent

$$\begin{cases} x + y - z = 1 \\ x - 2y - 3z = -2 \\ 2x + 5y = 5 \end{cases}$$

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Recitation (9.5)

Question1

The following system of non-linear equations

$$\begin{cases} 5x^2 + 3y^2 = 23 \\ x^2 - y^2 = 3 \end{cases}$$

has:

a) No solutions
b) One solution
c) Two solutions
d) Three solutions
e) Four solutions

Question2

Solve the following system

$$\begin{cases} 2x^2 + xy + y^2 = 4 \\ 3x^2 + 2xy + y^2 = 4 \end{cases}$$

Question3

Find the point(s) of intersection of the circle $(x-1)^2 + (y-2)^2 = 8$ and the line $y = 2x + 2$.

Question4

Find the solution set of the system

$$\begin{cases} \frac{3}{x} + \frac{1}{y} = 4 \\ \frac{9}{x} + \frac{5}{y} = 16 \end{cases}$$

Question5

The following system

$$\begin{cases} |x+1| - y = 3 \\ 2x - 3|y| = 7 \end{cases}$$

has:

a) No solution b) One solution c) Two solutions

d) Three solutions e) Four solutions

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Recitation (9.7)

Question1

If $A = \begin{bmatrix} 0 & -1 & 0 \\ 1 & 1 & 2 \\ 2 & 1 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -2 & 0 \\ 0 & -1 & 3 \\ 3 & 1 & 2 \end{bmatrix}$, then find

a) A + B
b) A – B
c) AB
d) A^2

Question2

If $A = \begin{bmatrix} 1 & x \\ y & 0 \end{bmatrix}$, then the set of all real solutions of (x, y) of $A^2 - A = I_2$ is

a) {(1, 2)} b) {(-1, -2)} c) $\{(c, 2c) / \ c \in \mathbb{R}\}$

d) $\{(c, -c) / \ c \in \mathbb{R}\}$ e) $\{\left(c, \frac{1}{c}\right) / \ c \in \mathbb{R}^*\}$

Question3

If $A = \begin{bmatrix} 1 & 3 & 4 \\ -2 & 2 & 5 \\ 1 & 3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 0 & 2 \\ 0 & 1 & 3 \\ -1 & 2 & 5 \end{bmatrix}$, and $D = AB$, then $D_{32} + D_{13} =$

a) 52 b) 11 c) 38 d) -15 e) 9

Question4

If $A = \begin{bmatrix} 1 & 2 & 4 \\ -1 & 0 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 2 & 1 \\ 3 & -1 & 2 \end{bmatrix}$, then find the matrix X such that $4X + B = 2X + 3A$.

Question5

If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 & 5 \\ 0 & -4 & 2 \\ 0 & 0 & -3 \end{bmatrix}$, and $C = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$, then find

a) AB
b) BA

c) AC

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Recitation (9.8)

Question1

(a) Find the inverse of $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 6 \end{bmatrix}$

(b) Show that $B = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ does not have an inverse.

Question2

Solve the following linear system using matrix inversion

$$\begin{cases} 2x + y = -7 \\ 3x + 2y = 19 \end{cases}$$

Question3

Given that $M = \begin{bmatrix} 2 & 9 \\ 1 & 5 \end{bmatrix}$ and $N = \begin{bmatrix} -1 & -1 \\ 4 & 3 \end{bmatrix}$, find the sum of the elements in the second column of $(MN)^{-1}$.

Question4

If A and B are 3x3 matrices such that $|A| = 5, and\ |B| = -2,$ Then $|3(A.B^2)^{-1}|$ =

a) 27/20 b) 15/10 c) -30/4 d) 10/27 e) 540

Question5

Let *A* and *B* be 4x4 invertible matrices. Which one(s) of the following statements are false?

a) $|A^2| = |A|^2$

b) $|(AB)^{-1}| = \frac{1}{|A|.|B|}$

c) $|(2AB)^{-1}| = \frac{16}{|A|.|B|}$

d) $A.A^{-1} = B.B^{-1}$

e) $|2B| = 16|B|$

f) $|A.B| = |A|.|B|$

g) $|A + B| = |A| + |B|$

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Recitation (10.1)

Question1

Which one of the following is the equation in standard form of the parabola with directrix $y = 7$ and focus (1,3)

a) $y - 5 = -\frac{1}{8}(x-1)^2$

b) $x - 5 = -\frac{1}{8}(x-1)^2$

c) $y - 5 = \frac{1}{8}(x-1)^2$

d) $x - 1 = \frac{1}{8}(y-4)^2$

e) $y - 5 = \frac{1}{4}(x-1)^2$

Question2

Find the equation in standard form of the open to the right parabola that passes through the points A(8,4) and B(11,5), such that the distance from the vertex to the focus is $\frac{1}{4}$.

Question3

Find the equation of the parabola that passes through A(-3,3) and B(5,3), and its focus is the midpoint of the segment [AB].

Question4

Find the vertex, focus, directrix and axis of symmetry of the parabola given by the equation $3y^2 + 18y - x + 7 = 0$.

Question5

Which one of the following points lies on the parabola that has vertex (7, 2) and focus (6, 2)

a) (2,-2) b) (2,1) c) (-7,-4) d) (0,8) e) (-1,-1)

Question6

Find an equation of the parabola passing through A(3,4) and (3,8) and having focus F with x-coordinates $= 0$.

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Recitation (10.2 & 10.3)

Question1

Find the center, the vertices, foci, and eccentricity of the ellipse given by the equation

a) $3x^2 + 2y^2 - 6x + 12y = -15$
b) $3y^2 + 2x^2 - 6y + 12x = -15$

Question2

1) Find the equation of the ellipse that has vertices at (3,8) and (3,-2), and foci at (3,6) and (3,0).
2) Find the equation in standard form, of the ellipse with foci at (-1,2) and (3,2) that passes through the point (3,5).

Question3

Find the points of intersection of the ellipse $\frac{(x+1)^2}{16} + \frac{(y-2)^2}{9} = 1,$ and the hyperbola $\frac{(x+1)^2}{16} - \frac{(y-2)^2}{9} = 1$.

Question4

Find the eccentricity of the hyperbola with asymptotes $y = \pm\frac{4}{5}x + 5$ and one vertex at (5,5) .

a) $\frac{\sqrt{41}}{5}$ b) $\frac{\sqrt{35}}{5}$ c) $\frac{3}{2}$ d) $-\frac{5}{2}$ e) $\frac{1}{3}$

Question5

Find the equation in standard form of the hyperbola with vertices (-1,0) and (-1,-4), and eccentricity $e = \frac{\sqrt{5}}{2}$.

Question6

Write the following equations in standard form and identify the corresponding conic for each one

a) $3x^2 - 12x + 3y^2 + 6y + 6 = 0$

b) $2x^2 - 8x - 2y^2 - 4y = 0$

c) $27x^2 + 36y^2 + 18x + 36y - 96 = 0$

d) $3y^2 - 12y - x + 14 = 0$

e) $\frac{3}{7}(x-1)^2 + \frac{5}{3}(y+1)^2 = \frac{11}{4}$