

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (002)-Term (182)
Recitation (2.8)

Question 1: Which one of following functions has an inverse?

- (a) $f(x) = x^2 + 5$
- (b) $f(x) = |x + 1| - 2, x \geq -2$
- (c) $f(x) = \sqrt{1 - x^2}$
- (d) $f(x) = (x + 3)^2 - 5, x \geq -3$

Question 2: For the following functions, find $f^{-1}(x)$ and state its domain and range

- (a) $f(x) = -\sqrt{4 - x^2}$ for $-2 \leq x \leq 0$
- (b) $f(x) = 2 + \sqrt{3 + x}$ for $x \geq -3$
- (c) $f(x) = \frac{2x+3}{x-1}$

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

- (a) -1
- (b) 1
- (c) -2
- (d) 2

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Recitation (4.1&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

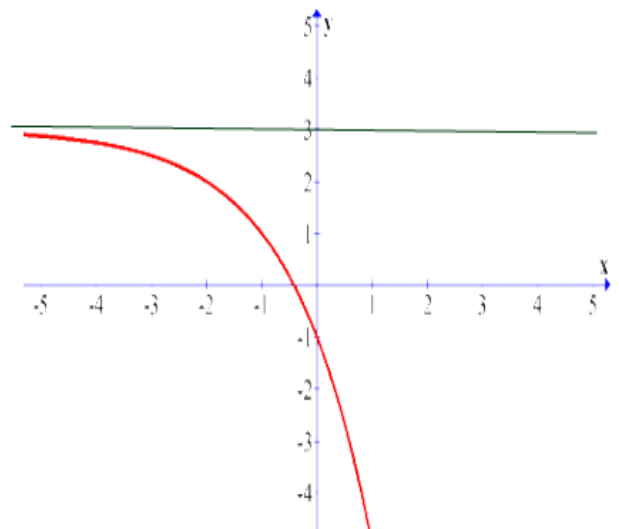
Question 2: Find the intersection points of the graphs of $y = \left(\frac{1}{3}\right)^{2x+5}$ and $y = 27$

Question 3: Graph the function. State the domain, range, and asymptote:

- a) $y = 3 - 10^{-x}$
b) $f(x) = e^{-|x|} - 1$

Question 4: 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) $y = (2)^{x-2} + 3$



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Recitation (4.3)

Question 1: Use the definition of the logarithmic function to find x in the following equations

a) $\log_x 25 = 2$

(b) $\log_7 \frac{1}{49} = 3x$

Question 2: Find the domain of the following functions:

a) $f(x) = \ln x + \ln(2 - x)$

b) $f(x) = \log_3 \left(\frac{x-1}{2-x} \right)$

c) $f(x) = \log|x^2 - x|$

Question 3: Graph the function. State the domain, range, and asymptote:

a) $y = 1 - \log(1 - x)$

b) $y = |\ln x|$

Question 4: 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) $(-\infty, 2) \cup (3, \infty)$

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Recitation (4.4)

Question 1:

(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

(2) 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

(a) $\log_{1/2} \sqrt[3]{32} + \log_3 \frac{1}{\sqrt{27}}$ (b) $\left(\frac{1}{25}\right)^{1-2\log_5 2}$

Question 3: Use the Laws of Logarithms to expand the following expression

$$\log_2 \left(\sqrt[3]{\frac{2xz^3}{y^2 + 4}} \right)$$

Question 4: Use the Laws of Logarithms to combine the following expression

$$3 \log_2 x - \frac{1}{3} \log_4 x^{12} + \frac{1}{2} \log_{\frac{1}{2}} x^6, \quad \text{where } x > 0$$

Question 5: If $a > 0$, $a \neq 1$, $x > 0$, $x \neq 1$, then simplify the expression

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

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Recitation (4.5)

Question 1: Solve the following equations:

a) $4^x + 2^{1+2x} = 50$

b) $e^x + 15e^{-x} - 8 = 0$

c) $x^2e^x + xe^x = e^x$

d) $\log_2(\log_3 x) = 4$

Question 2: 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 3: Find the intersection point(s) between the following functions

$$f(x) = \log_4 8 - \log_4(x + 1) \quad \text{and} \quad g(x) = \log_{16}(x + 1)$$

Question 4: Find the inverse function of f .

a) $f(x) = 3^{x+1}$

b) $f(x) = \log_2(x - 1)$

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Recitation (5.1)

Question1.

Find the least positive angle that is coterminal with the given angle.

a) -800°

c) 1270°

b) $\frac{51\pi}{2}$

d) 10

Question2

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 .

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

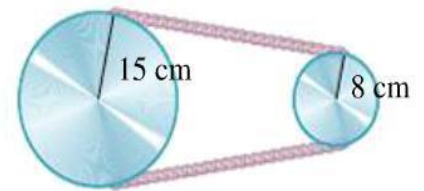
A) $\frac{75\pi}{4}$

B) $\frac{25\pi}{8}$

C) $\frac{75\pi}{8}$

D) $\frac{25\pi}{4}$

E) $\frac{375\pi}{2}$



Question5

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°

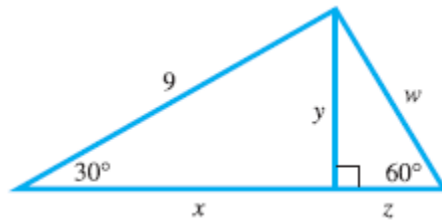
C) 10800°

D) 5400°

E) 1800°

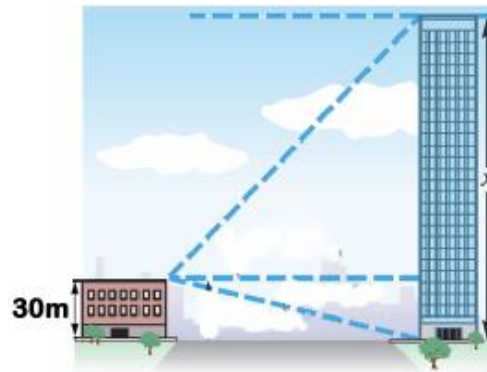
Question1: Find the value of $\left(\sin \frac{\pi}{3} \cos \frac{\pi}{4} - \sin \frac{\pi}{4} \cos \frac{\pi}{3}\right)^2$

Question2: Find the exact value of each labeled part with a variable in the following figure



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) $(30 + 60\sqrt{3})\text{m}$
- B) 150m
- C) $100\sqrt{3}\text{m}$
- D) 120m
- E) $90\sqrt{3}\text{m}$



Question4 From a point on the ground $100\sqrt{3}\text{ ft}$ from the base of a building, an observer finds that the angle of elevation to the top of the building is 30° and that the angle of elevation to the top of a flagpole on top of the building is α , with $\tan \alpha = \frac{21}{20\sqrt{3}}$. Then the Length of the flagpole is

- (a) 4 feet
- (b) 6 feet
- (c) 5 feet
- (d) 3 feet
- (e) 7 feet

Question1: Find the reference angle for the given angle

a) 800°

b) -105°

c) $\frac{5\pi}{7}$

d) 20

Question2:

Suppose that the terminal side of the angle θ in the standard position is defined by $3x + 2y = 0$, $x \leq 0$, then find $\sec \theta$.

Question3:

Let θ be an acute angle satisfying $4 \sin \theta = 5 \cos \theta$, then find $4 \tan \theta + \sec \theta$.

Question4:

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:

Find the exact value of the following expressions:

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

Question7: If $\cos \theta = -\frac{2}{7}$ and $\tan \theta < 0$, find $\csc \theta + \tan \theta$

Question1: Find the exact value of the following:

1) $\cos\left(\frac{-7\pi}{6}\right)$ 2) $\sin\left(\frac{-7\pi}{4}\right)$ 3) $\cot\left(\frac{-5\pi}{6}\right)$ 4) $\sec\left(\frac{11\pi}{6}\right)$

Question2: If $\cos 3 = a$ and $\sin 3 = b$, then $a - b =$

- A) a positive real number.
- B) a negative real number.
- C) zero.
- D) undefined.

Question3: Write the first expression in terms of the second

- 1- $\tan x, \sin x$ where x is in Quadrant IV
- 2- $\tan x, \sec x$ where x is in Quadrant III

Question4: Determine whether the function $f(x) = \cos(-2 \sin^2 x^3)$ is even, odd, or neither.

Question1: Graph the following functions:

a) $f(x) = |\sin x|$, where $-2\pi \leq x \leq 2\pi$

b) $f(x) = 1 + \cos\left(3x + \frac{\pi}{2}\right)$, where $-\frac{\pi}{6} \leq x \leq \frac{5\pi}{6}$

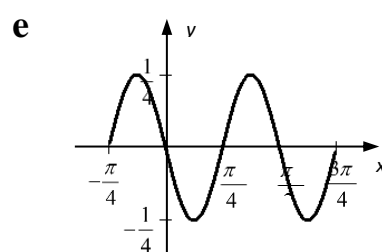
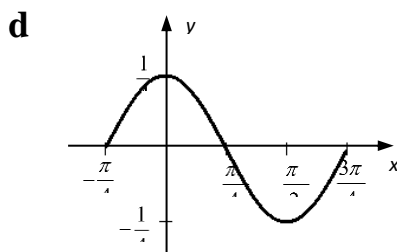
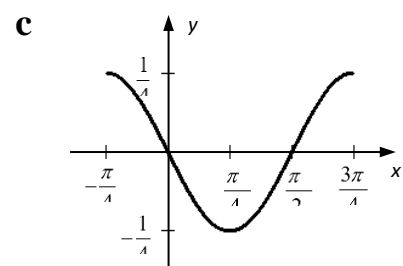
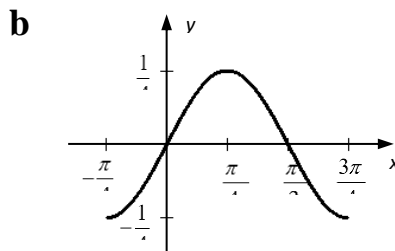
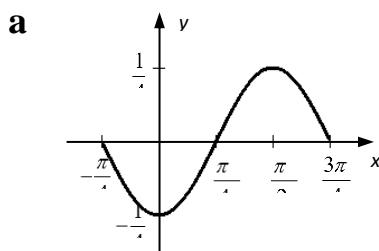
Question2: Find the amplitude, period, and the horizontal shift of the graph of following function

$$y = \frac{1}{2} - \frac{1}{2} \cos\left(\pi x + \frac{\pi}{2}\right)$$

Question3: If M is the maximum value and m is the minimum value of the function $f(x) = -3 |\sin(2\pi x - 1)| + 5$, then $M + m =$

- A) 10 B) 13 C) 0 D) 3 E) 7

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?



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Recitation (6.4)

Question1: Graph the following functions:

a) $y = 4 \tan(4x - 2\pi)$, where $\frac{3\pi}{8} \leq x \leq \frac{7\pi}{8}$

b) $y = \frac{1}{2} \sec(2\pi x - \pi)$, where $0 \leq x \leq \frac{3}{2}$

Question2: For the following function $y = \frac{1}{2} \cot(2x - 3\pi)$ on the interval $[\frac{\pi}{4}, \frac{7\pi}{4}]$

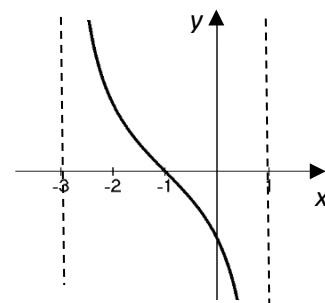
- (a) Find the number of vertical asymptotes of the graph of the function.
(b) Find the number of x -intercepts of the graph of the function.

Question3: The number of intersection point(s) of the graphs of $y = \tan|x|$ and $y = 1$ in the interval $(-\frac{3\pi}{2}, \frac{3\pi}{2})$:

- A) 2 B) 3 C) 4 D) 5 E) 6

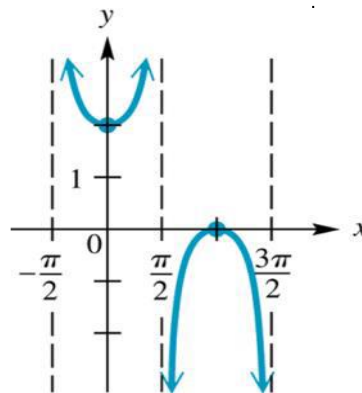
Question4: The graph below can be represented by the trigonometric function

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



Question5

Write an equation of a function for the given graph



Question1

Find the exact value of each expression:

a) $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

b) $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$

c) $\tan^{-1}(-1)$

Question2

Find the exact value of

a) $\cos^{-1}\left(\cos\frac{3\pi}{5}\right)$

b) $\sin^{-1}\left(\cos\frac{5\pi}{4}\right)$

c) $\tan^{-1}\left(\tan\frac{4\pi}{3}\right)$

d) $\sin^{-1}\left[\sin\frac{3\pi}{5}\right]$

e) $\cos\left(\cos^{-1}\frac{\pi}{2}\right)$

Question3

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

Question4

The domain of $y = 2 \sin^{-1}\frac{x}{3} =$

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

Question1: Verify the following identities:

a) $\frac{\sin x + \cos x}{\sec x + \csc x} = \sin x \cos x$

b) $\frac{1}{\sec x + \tan x} + \frac{1}{\sec x - \tan x} = 2 \sec x$

c) $\frac{\cos^2 x + \tan^2 x - 1}{\sin^2 x} = \tan^2 x$

Question2

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

Question3

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 $A + B$.

Question4

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) $\tan \theta + \cot \theta$

Question5:

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

Question1 Find the value of

a) $\sin(-15^\circ)$ b) $\cos\left(\frac{13\pi}{12}\right)$ c) $\tan\left(\frac{17\pi}{12}\right)$ d) $\frac{\tan 70^\circ + \cot 10^\circ}{1 - \tan 80^\circ \cot 20^\circ}$

Question2: Verify the following identities:

a) $\cot(x + y) = \frac{\cot x \cot y - 1}{\cot x + \cot y}$

b) $\sin\left(\frac{3\pi}{2} + \theta\right) + \cos\left(\frac{3\pi}{2} - \theta\right) = -\sin\theta - \cos\theta$

Question3 If α and β are two angles in standard position with $\sin\alpha = \frac{4}{5}$, where $\frac{\pi}{2} < \alpha < \pi$ and $\cos\beta = \frac{-5}{13}$, where $\pi < \beta < \frac{3\pi}{2}$. 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

Question4 Graph the following function:

$$f(x) = \cos 2x + \sqrt{3} \sin 2x$$

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Recitation (7.3)

Question1: Verify the following identities:

a) $\tan\left(\frac{x}{2}\right) + \cos x \tan\left(\frac{x}{2}\right) = \sin x$

b) $\frac{1+\sin 2x}{\sin 2x} = 1 + \frac{1}{2}\sec x \csc x$

Question2

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

Question3

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

Question4

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

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

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Recitation (7.4&7.5)

Question1 Solve the following equations:

a) $2 \sin^2 \theta - 3 \sin \theta - 2 = 0$

b) $\sin 2 \theta + \cos \theta = 0$

c) $\tan \frac{\theta}{2} - \sin \theta = 0$

Question2

The sum of all solution(s) of the equation $\sin x = \cos \left(\frac{x}{2} \right)$ in the interval $\left[0, \frac{3\pi}{2} \right)$ is

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

Question3

The number of solution(s) of $\sin x - \sqrt{3} \cos x = 1$, $0 \leq x < 2\pi$, is

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

Question1

Are the vectors $\vec{u} = \langle 2 \cos 85^\circ, 2 \sin 85^\circ \rangle$ and $\vec{v} = 3 \langle \cos 25^\circ, \sin 25^\circ \rangle$ 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 $\vec{u} = \langle 3, 4 \rangle$ and $\vec{v} = \langle 2, k \rangle$ have the same direction.

Question4

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

- a) $\langle 14, 4 \rangle$
- b) $\langle -1, 1 \rangle$
- c) $\langle 2, -7 \rangle$
- d) $\langle 1, -1 \rangle$
- e) $\langle 7, -2 \rangle$

Question5

If θ is an angle between the vectors $v = -i + 2j$ and $w = 2i - j$, then find $\sin(2\theta)$, where $0 \leq \theta \leq \pi$.

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Recitation (10.1)

Question1 Solve the following systems:

a) $\begin{cases} x - y = 4 \\ 2x + y = 2 \end{cases}$

b) $\begin{cases} -\frac{1}{3}x - \frac{1}{12}y = -1 \\ \frac{2}{3}x + \frac{1}{6}y = 3 \end{cases}$

c) $\begin{cases} -\frac{1}{10}x + \frac{1}{2}y = 4 \\ 2x - 10y = -80 \end{cases}$

Question2

If the following system is dependent, find $a + b$.

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

Question3 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

Question4

The sum of two numbers is twice their difference. The larger number is 6 more than twice the smaller. Find the numbers.

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Recitation (10.4)

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

Question5

Solve the following system $\begin{cases} x + \sqrt{y} = 0 \\ y^2 - 4x^2 = 12 \end{cases}$

Question1 Determine whether the following systems is *dependent*, *inconsistent* or has *a unique solution*

$$i) \begin{cases} x - 2y + z = 1 \\ y + 2z = 5 \\ x + y + 3z = 8 \end{cases}$$

$$ii) \begin{cases} x + y + z = 2 \\ y - 3z = 1 \\ 2x + y + 5z = 0 \end{cases}$$

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

Question2: Use the Gauss Jordan method to solve the following linear system

$$\begin{cases} x + y + 6z = 3 \\ x + y + 3z = 3 \\ x + 2y + 4z = 7 \end{cases}$$

Question3

If the echelon form of the linear system

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

a) $(-5, -10, 5)$

b) $(3, -6, -3)$

c) $(-5, 10, -3)$

d) $(-2, 7, -1)$

e) $(-3, 6, -2)$

Question1

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

A) $A + B$

B) BA

C) B^2

Question2 If A, B and C are square matrices and I_n is the identity matrix, which one of the following statement is True?

- i. $(A + B)(A^2 - AB + B^2) = A^3 + B^3$
- ii. $(A + I_n)(A - I_n) = A^2 - I_n$
- iii. $(A - B)^2 = A^2 - 2AB + B^2$
- iv. $AB = 0$ implies $A = 0$ or $B = 0$
- v. $I_n A = I_n$

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 $C = AB$, then $c_{32} + c_{13} =$

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 that satisfies $4X + B = 2X + 3A$.

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Recitation (11.3)

Question1

Find the inverse of the matrix if it exists

(a) $A = \begin{bmatrix} 3 & 2 \\ 6 & 4 \end{bmatrix}$.

(b) $B = \begin{bmatrix} 2 & 4 & 1 \\ -1 & 1 & -1 \\ 1 & 4 & 0 \end{bmatrix}$.

Question2

Use the inverse of the coefficient matrix to solve the following system

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

Question3

Use the inverse of the coefficient matrix (if possible) to solve the following systems

a) $\begin{cases} x + 2y + 3z = 1 \\ 4x + 5y - z = 2 \\ x - y - 10z = -3 \end{cases}$

b) $\begin{cases} x + 2y + 3z = 1 \\ 4x + 5y - z = 3 \\ x - y - 10z = 0 \end{cases}$

Question4

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

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 $|A|$.

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 Let A and B be 4×4 invertible matrices. Determine whether each of the following statements is true or false:

- a) $|A^2| = |A|^2$ c) $|2B| = 8|B|$ e) $|A \cdot B| = |A| \cdot |B|$
 b) $|A + B| = |A| + |B|$ d) $|I_n| = 1$ f) $|A^{-1}| = |A|$

Question4 If $\det(M - xI) = 0$, $M = \begin{bmatrix} 2 & -1 \\ 1 & 0 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then $x =$

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

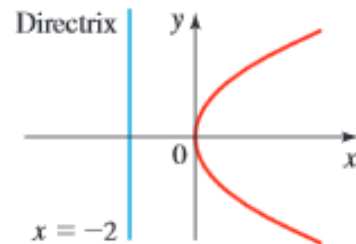
Question5 If A and B are 3×3 matrices such that $|A| = 5$ and $|B| = -2$, then $|3(A B^2)^{-1}| =$

- a) $\frac{27}{20}$ b) $\frac{15}{10}$ c) $\frac{-30}{4}$ d) $\frac{10}{27}$ e) 540

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 an equation of the parabola from the given graph



Question3

Find the vertex, focus, and directrix of the parabola given by the equation:

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

Question4

Which of the following points lies on the parabola that has vertex $(2, 1)$ and focus $(2, 3)$?

- A) $(4, 2)$
- B) $(6, 3)$
- C) $(5, 3)$
- D) $(1, -3)$
- E) $(-1, 3)$

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Recitation (12.2 & 12.3)

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 $\frac{(x+1)^2}{16} - \frac{(y-2)^2}{9} = 1$:

- a) By solving the system of nonlinear equations.
- b) By graphing .

Question4

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

Question5

Write the following equations in standard form and identify the corresponding conics

a) $x^2 - 4x + y^2 + 2y + 2 = 0$

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

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