King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math 001 - Term 161
Recitation (R1, R2)

Question 1: How many rational and irrational numbers are possible between 0 and 1 ?

(a) 1 (b) Finite (c) 0 (d) Infinite (e) 2

Question 2: $\acute{A}$ will contain how many elements from the original set A

(a) 1 (b) Infinite (c) 0 (d) All elements in A (e) More elements than U

Question 3: Given the sets

U= {y|y is an even number with $-8 < y < 10$}

A= $\{-6, -4, -2, \ 0\}$

B={y|y is an even prime number only}

C= {y|y is a composite number < 9}

Then $\acute{A} \cap (B \cup \acute{C}) =$.

(a) $\acute{A}$ (b) $B \cup C$ (c) A (d) U (e) $\emptyset$

Question 4: Which one of the following statements is TRUE?

(a) Every rational number has a multiplicative inverse
(b) Every irrational number is not real number
(c) Every even integer has an additive inverse
(d) $\pi = \frac{22}{7}$
(e) The set $\{-1, 0\}$ is closed under addition

Question 5: Which one of the following statements is TRUE?

(a) The set of irrational numbers is closed with respect to multiplication.
(b) The set $\{-1, 0, 1\}$ is closed with respect to multiplication.
(c) If x is any integer and y is any irrational number, then x/y is irrational.
(d) The distributive law states that $a \div (b + c) = (a \div b) + (a \div c)$
(e) Any irrational number has a terminating or repeating decimal expansion.

Question 6: Given $\frac{1}{3} \leq x < \frac{2}{3}$, the expression $\left|x - \frac{2}{3}\right| - \left|\frac{1}{4} - x\right|$ can be written without the absolute value symbols as:

(a) $-\frac{11}{12}$ (b) $2x - \frac{11}{12}$ (c) $\frac{11}{12} - 2x$ (d) $-\frac{5}{12}$ (e) $\frac{5}{12}$

Question 7: Which from the following set has the closure property with respect to multiplication?

(a) $\{-1\}$
(b) $\{-2, 1\}$
(c) $\{1, 2\}$
(d) $\{-1, 1\}$
(e) $\{-1, 0\}$

Question 8: By performing the correct order of operations of the following expression

$\left[-2 + \frac{11}{5} + \left(-\frac{11}{5}\right)\right] \div \left(\frac{1}{3} - \frac{1}{4}\right) - \left(\frac{-3^2}{4}\right) + 2 =$

(a) $-\frac{79}{4}$
(b) $\frac{7}{3}$
(c) $-\frac{97}{4}$
(d) $\frac{49}{12}$
(e) $-\frac{5}{12}$

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Math 001 - Term 161
Recitation (R.3)

Question 1: If $\frac{3x^4-12x^2+6x-15}{x^2+1} = Q(x) + \frac{R(x)}{x^2+1}$ then find $R(x)$ and state the degree and the leading coefficient of $Q(x)$.

Question 2: If the coefficient of x^3 in the product $x^2\left(kx-\frac{2}{k}\right)\left(5x+\frac{1}{k}\right)$ is $-\frac{7}{3}$, then k is equal to

(a) -3 (b) $-\frac{30}{4}$ (c) 3 (d) $\sqrt{\frac{6}{7}}$ (e) $-\sqrt{\frac{6}{7}}$

Question 3: Which one of the following is a polynomial of degree 2?

(a) $x^2+\frac{2}{x}+x+1$

(b) $x^2+x^{3/2}+\sqrt{2}$

(c) $(3x+2)^3+\sqrt{2}x^2-27x^3$

(d) $\frac{x}{x^3-1}$

(e) $x^2+x+1+\sqrt{x}$

Question 4: $If\ X=(a-2b)^3\ and\ Y=(2a+b)^3,\ then\ find\ \ X-Y$

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Recitation (R.4)

Question 1: Factor the following completely

(a) $5x^6 - 40y^3$

(b) $3x^{-\frac{1}{2}} + 4x^{\frac{1}{2}} + x^{\frac{3}{2}}$

(c) $6p^4 + 7p^2 - 3$
(d) $a^3 - b^3 - 1 + a^3b^3$
(e) $9(a-4)^2 + 30(a-4) + 25$

Question 2: The sum of all prime factors of $4y^4 - 13y^2 + 9$

(a) $4y^2 + 6$
(b) $4y^2 - 6$
(c) $6y$
(d) $-6y$
(e) $10 - 5y^2$

Question 3: The possible value(s) of k that makes the trinomial

$36x^2 + kxy + 49y^2$ a perfect square is (are)

(a) 84 (b) -84 (c) ± 84 (d) ± 42 (e) -42

Question 4: One of the factor of $4x^2 - 8xy - 5y^2 - 4x + 10y$

(a) $\mathbf{2x + y - 2}$

(b) $\mathbf{4x - 4y - 2}$

(c) $\mathbf{2x + y}$

(d) $\mathbf{2x - y + 2}$

(e) $\mathbf{5x - 2y}$

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Recitation (R.5)

Question 1: Simplify the rational expression

(a) $\frac{2}{4+x}+\frac{16}{x^2-16}+\frac{6}{4-x}$

$(b)\ \frac{4}{2-x}+\frac{5}{x^2+2x+4}\div\frac{x^2-4x+4}{x^3-8}$

Question 2: Simplify the following expression

(a) $\frac{x+\frac{1}{x+2}}{x-\frac{1}{x+2}}$

$(b)\ 1+\frac{1}{1+\frac{1}{1+x}}$

Question 3: The expression $\frac{\frac{2x^2-3x-2}{x^2-1}}{\frac{2x^2+5x+2}{x^2+x-2}}$ simplifies to

$(a)\ \frac{x+1}{x-2}$ (b) $\frac{x-2}{x+1}$ (c) $\frac{2x+1}{x+2}$ (d) $\frac{x+2}{2x+1}$ (e) $\frac{x+2}{x-1}$

Question 4: The least common denominator (LCD) of the expression

$$\frac{1}{x^3-1}+\frac{3}{14(x-1)^3}-\frac{5}{24(x^3+x^2+x)}$$

(a) $2x(x-1)^3(x^2+x+1)$

(b) $168x(x-1)^3(x^2+x+1)$

(c) $2(x-1)^3(x+1)^3$

(d) $168(x-1)^3(x+1)^3$

(e) $2(x+1)^3(x^3-1)$

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Recitation (R.6)

Question 1: The expression $\left(\frac{-27}{8}\right)^{\frac{-2}{3}} - (2)^{\frac{1}{6}}(-32^{\frac{1}{6}}) + 3(-2)^0$

$(a)\ -\frac{5}{9}$ (b) $\frac{41}{9}$ (c) $\frac{31}{9}$ (d) $\frac{23}{9}$ (e) $\frac{49}{9}$

Question 2: Simplify the expression below:

$\left(\frac{x^{1/2}y^2}{2y^{1/4}}\right)^4 \left(\frac{4x^{-2}y^{-4}}{y^2}\right)^{1/2}$ Where $x > 0\ \ and\ \ y > 0$

Question 3: Simplify the expression:

$$\frac{x^{-2} - y^{-2}}{x^{-1} + y^{-1}}$$

Question 4: Simplify the expression:

$$\frac{(7-3x)^{1/2} + \frac{3}{2}x(7-3x)^{-\frac{1}{2}}}{7-3x}$$

Question 5: The value of the expression $\left(\frac{x^{-2/3}}{y^{1/2}}\right)\left(\frac{x^{-2}}{y^{-3}}\right)^{1/6} + z^{2/5}$ using

$x = 1, y = 4,\ \ z = 32$ is

(a) -1

(b) -3

(c) 5

(d) -5

(e) 3

King Fahd University of Petroleum and Minerals
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Recitation (R.7)

Question 1: Find the value of $\frac{2}{\sqrt[3]{81}} + \frac{4}{\sqrt[3]{24}} - \frac{1}{\sqrt[3]{3}}$

Question 2: Simplify the expression $5x\sqrt[3]{24x^4} + \frac{21x^3}{\sqrt[3]{-9x^2}}$

Question 3: If M= $\frac{-4}{1+2\sqrt{20}-\sqrt{45}}$ and N= $\frac{\sqrt[4]{243}}{\sqrt{\sqrt{3}}}$ then find the sum of M and N

(a) $-2-\sqrt{2}$
(b) $2-\sqrt{2}$
(c) $4-\sqrt{5}$
(d) $4-2\sqrt{5}$
(e) $-4-\sqrt{5}$

Question 4: Simplify the expression and write the answer without absolute value symbols:
$\sqrt{(-7)^2} - \sqrt{49+42x+9x^2} + \sqrt[3]{(-7)^3}$ where $x < -3$

Question 5: By rationalizing the denominator, $\frac{2x-2y}{\sqrt{x}-\sqrt{y}}$ is equal to

(a) $\sqrt{x}-\sqrt{y}$

(b) $2\sqrt{x}$

(c) $2\sqrt{y}$

(d) $2\left(\sqrt{x}+\sqrt{y}\right)$

(e) 2

King Fahd University of Petroleum and Minerals
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Recitation (1.1 & 1.2)

Question 1: If the equation $\frac{3}{10}(x+2)-\frac{1}{2}(x+2)=\boldsymbol{m}x-\frac{2}{5}$ is an identity then find the value of **m**

Question 2: $If\ x=\frac{5}{12}$ is a solution of the equation $\frac{x}{5}-\frac{3}{2}=\frac{4x}{5}-\frac{\boldsymbol{a}}{4}$

then $\boldsymbol{a}$ is equal to:

(a) -7 (b) $-\frac{1}{7}$ (c) $\frac{1}{7}$ (d) 7 (e) $\frac{7}{4}$

Question 3: Solve the equation for k.

$(a)-k=(5k+3)(3x+1)$

(b) $\frac{k+1}{x}=\frac{x+1}{k}+\frac{k-1}{x}$

Question 4: Determine whether each of the following equations is an identity, a conditional equation or contradiction.

(a) $3+\frac{1}{x+1}=\frac{4x}{x+1}$

(b) $-\frac{3}{5}(x-5)+\frac{4}{5}(x-6)=\frac{1}{5}x-\frac{9}{5}$

(c) $\frac{2}{5}(x+7)=\frac{1}{5}(x+12)+\frac{1}{5}(x+1)$

Question 5: If the length of each side of the original square is decreased by 4 inches, the perimeter of the new square is 10 inches more than half the perimeter of the original square. What are the dimensions of the original square?

King Fahd University of Petroleum and Minerals
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Recitation (1.3)

Question 1: The sum of the real part and the imaginary part of the complex number $\frac{\sqrt{-4}(\sqrt[3]{-27}-\sqrt{-16})}{(1+i)^2}+(1-i)^3$ is equal to

(a) -11
(b) -7
(c) -1
(d) 11
(e) $4i$

Question 2: $If\ A+iB=\frac{(\sqrt[3]{-125}\,i-\sqrt{-25}\sqrt{-1}\,)}{(2i-1)(2i+1)i^{103}}$ then calculate B – A.

Question 3: If $Z=\left(\frac{2+i}{1-i}\right)^2+\left(\frac{1+i}{1-i}\right)^{21}$, then find $\bar{Z}$.

Question 4: $If\ i=\sqrt{-1},\ then\ the\ expression\ \frac{3i^{90}-9i^{92}}{2i^{89}-4i^{91}}\ simplifies\ to$

(a) $2i$ (b) i (c) $-i$ (d) $\frac{1}{2}i$ (e) $-\frac{1}{2}i$

Question 5: $If\ Z=-i$, then find the value of $2Z^{98}+2Z^{99}+2Z^{100}+1$

Question 6: Find the reciprocal of the complex number

$\left(\sqrt[3]{-27}+\sqrt{-9}\right)i+\sqrt{(-5)^2}$

King Fahd University of Petroleum and Minerals
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Math (001)-Term (161)
Recitation (1.4)

Question 1: For the given equation $\sqrt{7}x^2 + 6x - \sqrt{7} = 0$, state the number of distinct solution, and tell whether they are rational, irrational, or non-real complex numbers.

Question 2: The product of all the solutions of the equation $x^3 - 64 = 0$ is

$(a)\ 64$ $(b) -8 + 8\sqrt{3}i$ $(c) -8 - 8\sqrt{3}i$ $(d)\ 0$ $(e)\ 8$

Question 3: When completing the square in the equation $4x(x-2) = -7$ we get $(x+a)^2 = b\ , then\ \ a + b^2 =$

$(a)\ \frac{25}{16}$ $(b)\ 1 + \frac{\sqrt{3}}{2}i$ $(c)\ 1 - \frac{\sqrt{3}}{2}i$ $(d) -\frac{7}{16}$ $(e)\ 0$

Question 4: If the given equation $kx^2 = kx - 16$ is a **quadratic equation** and has a double solution (two equal solutions), then, *k* =

$(a)\ 0\ and\ 64$ (b) 0 (c) 64 (d) 16 (e) 0 and 16

Question 5:

(a) If -4 is a solution of $\boldsymbol{a(x+3)^2 + 2 = 0}$, then find the other solution of this quadratic equation.

(b) If the sum and the product of the two roots of the equation $0.9x^2 + bx + c = 0\ \ are\ \frac{4}{3}\ \ and\ 1$ respectively, then find the value of $b\ and\ c$.

(c) $If\ 9x^2 - 1 - 4xy = 3y^2\ then\ \ solve\ for\ y$

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (001)-Term (161)
Recitation (1.6)

Question 1: The solution set of $(2x-1)^{\frac{2}{3}} = x^{\frac{1}{3}}$ consists of

(a) one positive integer and one negative rational number

(b) one positive integer and one negative irrational number

(c) one negative integer and one positive rational number

(d) one positive integer and one positive rational number

(e) one rational and one irrational numbers

Question 2:

(a) Find the sum of all solutions of $\sqrt{x+2} = 1 - \sqrt{3x+7}$

(b) Find the sum of all solutions of $x - \sqrt{x} = 12$

(c) Find the sum of all solutions of the following equation:

$$\frac{10}{x-5} + x = 1 - \frac{2x}{5-x}$$

Question 3: Find the solution set of the equation $\sqrt{2x} = \sqrt{x+7} - 1$

Question 4: If $x > \frac{1}{2}$, then the solution set of $(2x-1)^{\frac{2}{3}} - 2(2x-1)^{\frac{1}{3}} - 3 = 0$ is

$(a)\ \{-13, 1\}$ (b) $\{-12\}$ (c) $\{2\}$ (d) $\emptyset$ (e) $\{0, 14\}$

Question 5: The solution set of the equation $7x^{-2} + 19x^{-1} = 6$ is

(a) $\left\{\frac{7}{2}, -\frac{1}{3}\right\}$ (b) $\left\{\frac{2}{7}, -3\right\}$ (c) $\left\{-\frac{7}{2}, -\frac{1}{3}\right\}$ (d) $\left\{\frac{7}{2}, 3\right\}$ (e) $\left\{-\frac{7}{2}, \frac{1}{3}\right\}$

King Fahd University of Petroleum and Minerals
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Math (001)-Term (161)
Recitation (1.7)

Question 1: Find the solution set of the following inequality:

(a) $-\frac{1}{2} \leq \frac{4-3x}{5} \leq \frac{1}{4}$

$(b)\ 4x^2 + 3x \leq -1$

(c) $\frac{(x-8)^8}{x^2+7x+12} \leq 0$

Question 2: The solution set of the inequality $0 < x^2 - 4 \leq 5$ is

(a) $(-3, -2] \cup (2,\ 3]$

(b) $(-3,\ 3]$

(c) $(-3,\ 3)$

(d) $[-3, -2) \cup (2,\ 3]$

(e) $(-3,\ -2]$

Question 3: If the solution set of the inequality $3x(x-1) < 2(x^2+2)$, is given by the interval $(\mathbf{m}, \mathbf{n})$ then calculate $\mathbf{m} - \mathbf{n}$.

Question 4: Find the values of ***K*** for which the equation $2x^2 - 4x + k = 1$ has <u>*two non-real complex solutions*</u>.

Question 5: Solve the following nonlinear inequality and express the solution using interval notation.

$$\frac{x}{2} \geq \frac{5}{x+1} + 4$$

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Recitation (1.8)

Question 1: If A is the solution set of $\frac{x^2+14x+49}{x^2+x-12} \leq 0$

and B is the solution set of $\left|\frac{x-4}{3x+1}\right| \geq 0, then\ A \cap B =$

(a) $[-7, 3)$

(b) $(-4,\ 3)$

(c) $\{-7\} \cup \left(-4, -\frac{1}{3}\right) \cup \left(-\frac{1}{3},\ 3\right)$

(d) $(-4,\ 3) \cup \{-7\}$

(e) $\left(-7, -\frac{1}{3}\right) \cup \left(-\frac{1}{3},\ 3\right)$

Question 2: The solution set of the inequality $\left|\frac{1}{x}\right| < 5$ is

(a) $\left(-\infty, -\frac{1}{5}\right) \cup \left(\frac{1}{5},\ \infty\right)$ (b) $\left(-\frac{1}{5},\ \frac{1}{5}\right)$ (c) $(-5,\ 5)$ (d) $(-\infty, \infty)$ (e) $\left(-\frac{1}{5}, \infty\right)$

Question 3: Find the sum of all solutions of $3|2-x|^2 - 7|x-2| = 6$

Question 4: If $|x-5| < \frac{1}{2}$ is equivalent to $m < 2x - 3 < n$, then the values of $m\ and\ n$ are

(a) $-1, 1$ (b) $-\frac{1}{2}, \frac{1}{2}$ (c) $6,\ 8$ (d) $3,\ 4$ (e) $9,\ 11$

Question 5:

(a) Solve the equation $|x-1| = |3x+2|$

(b) Solve the inequality $\left|\frac{5}{3} - \frac{1}{2}x\right| + \frac{1}{3} > \frac{5}{9}$

(c) Solve the inequality $\left|\frac{3x+2}{x}\right| < 1$

King Fahd University of Petroleum and Minerals
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Math (001)-Term (161)
Recitation (2.1)

Question 1: Find the coordinates of the points that divide the line segment joining $(4,5)\ \ and\ \ (10,14)$ into three equal parts.

Question 2: Are the points A(1, 1), B(5, 2), C(3, 4) and D(-1, 3) the vertices of a parallelogram or of a rhombus?

Question 3: Plot the following graph:

(a) $x=\sqrt{y-1}$ (b) $y=-|x+4|$ (c) $y=x^2+1$

Question 4: Find the distance between the points $P(2x,-7x)$ and $Q(-2x,-4x)$ where $x<0$.

Question 5: If the point $(1,\ 4)$ is 5 units from the midpoint of the line segment joining $(3,-2)\ and\ (x,\ 4)$, then x is equal to

(a) either $7\ or\ -9$

(b) -15

(c) either $4+3\sqrt{11}\ \ or\ \ 4-3\sqrt{11}$

(d) either $-7\ or\ 9$

(e) 15

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (001)-Term (161)
Recitation (2.2)

Question 1: Find the general form of the equation of a circle with center at (-3, 5) and tangent to the y-axis

Question 2: Which of the following statements is FALSE about graph of the equation $\left(x-\frac{1}{2}\right)^2+\left(y-\frac{1}{4}\right)^2=m$?

(a) If $m=-\frac{1}{16}$ then the graph is nonexistent

(b) If $m=\frac{1}{16}$ then the graph of the equation is a circle that is tangent to x-axis

(c) If $m=\frac{1}{4}$ then the graph of the equation is a circle that is tangent to both y-axis and x-axis

(d) If $m=0$ then the graph of the equation is a point

(e) If $m=\frac{1}{4}$ then the graph of the equation is a circle that is tangent to y-axis

Question 3: The equation of a circle $x^2+y^2-4y=5-k^2$ which is tangent to X-axis, then $k=$

$(a)\ \pm\sqrt{5}$ $(b)\ 0$ $(c)\ \pm 2$ $(d)\ \pm 5$ $(e)\ \pm 1$

Question 4: Which of the axis is the circle $x^2+y^2-4x-2y+1=0$ tangent to?

Question 5: Let **M** be the midpoint of the line whose endpoints are $(1,-2)\ and\ (-3,\ 6)$, and let **C** be the center of the circle $x^2+4x+y^2-8y+2=0$. Then, the distance between **M** and **C** is equal to

(a) $\sqrt{37}$ (b) $\sqrt{13}$ (c) $\sqrt{5}$ (d) $3\sqrt{5}$ (e) 9

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (001)-Term (161)
Recitation (2.3)

Question 1: Find the domain and the range of the following function:

(a) $f(x) = \sqrt{-3x - 12}$

(b) $f(x) = \sqrt{|x - 5|}$

(c) $f(x) = \frac{2x-3}{x-4}$

(d) $f(x) = \sqrt{x^2 - 25}$

(e) $f(x) = -\sqrt{x + 2} + 3$

Question 2: The domain of the function $y = \frac{\sqrt{x+1}}{x}$ is

(a) $(-1, 0) \cup (0, \infty)$ (b) $[-1, \infty)$ (c) $[-1, 0) \cup (0, \infty)$ (d) $[1, \infty)$ (e) $[0, \infty)$

Question 3: Identify the set of ordered pairs $(x,\ y)$ or the equation that define y as a function of x:

(a) $\{(2, -3), (4,\ 6), (3, -1), (6, 6), (2,\ 3)\}$

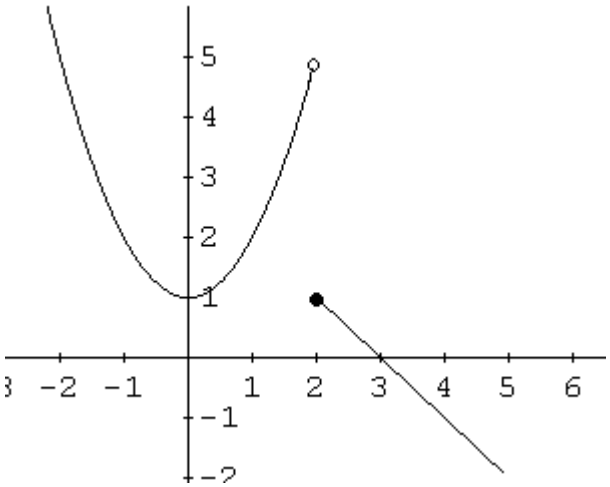
(b) $y = \pm\sqrt{x}$

(c) $(x - 5)^2 = 25 - (y - 3)^2$

(d) $|y + 1| = x$

(e) $xy - y = 1$

Question 4: Find the Intervals on the Domain in which the Function is Increasing and Decreasing



(a) Increasing $[0, 2)$ and Decreasing $(-\infty, \infty)$

(b) Increasing $[0, 2)$ and Decreasing $(-\infty, 0) \cup (0, \infty)$

(c) Increasing $(-\infty, \ \ 0] \cup [2, \infty)$and Decreasing $[0, 2)$

(d) Increasing $(-\infty, 0) \cup (2, \infty)$ and Decreasing$[0, 2)$

(e) Increasing $[0, 2)$ and Decreasing $(-\infty, 0] \cup [2, \infty)$

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (001)-Term (161)
Recitation (2.4 & 2.5)

Question 1: Let f be a linear function such that $f(9) = 0$ and the graph of f is parallel to the line $x - 3y - 4 = 0$, then $f(3)$ *is equal to*

(a) -18 (b) 18 (c) -2 (d) 10 (e) $-\frac{1}{3}$

Question 2: Find $\boldsymbol{k}$ so that the line passing through $(3, -1)$ and $(k,\ 2)$ is perpendicular to $y = -3$.

Question 3: The equation of the line passing through (4, 1) and parallel to $x = -5$ is

$(a)\ x = -5$ $(b)\ y = 1$ $(c)\ x = 1$ $(d)\ x = 4$ $(e)\ 4x + y = -5$

Question 4: The line with x-intercept $\frac{1}{4}$ and y-intercept $-\frac{1}{2}$ intersects the line $y = 2$ at the point $(p,\ q)$. The value of p is

(a) $\frac{5}{4}$

(b) 1

(c) $-\frac{5}{2}$

(d) $\frac{1}{2}$

(e) $\frac{3}{4}$

Question 5: A point that lies on the line that is perpendicular to the line $3y - 2x + 6 = 0$ and passes through the point $(2,\ 3)$ is

(a) $(-2,\ 1)$ (b) $(1,\ 5)$ (c) $(4,\ 3)$ (d) $(6, -5)$ (e) $(3,\ \frac{3}{2})$

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (001)-Term (161)
Recitation (2.6)

Question 1: The set of all values of x for which

$f(x) = \left[\!\left[1 - \frac{1}{2}x\right]\!\right]$ $is\ above\ x-axis$ lies in the interval

(a) $(2,\ \infty)$

(b) $(-\infty,\ 0]$

(c) $(0,\ \infty)$

(d) $(0,\ 2]$

(e) $[\frac{1}{2},\ \infty)$

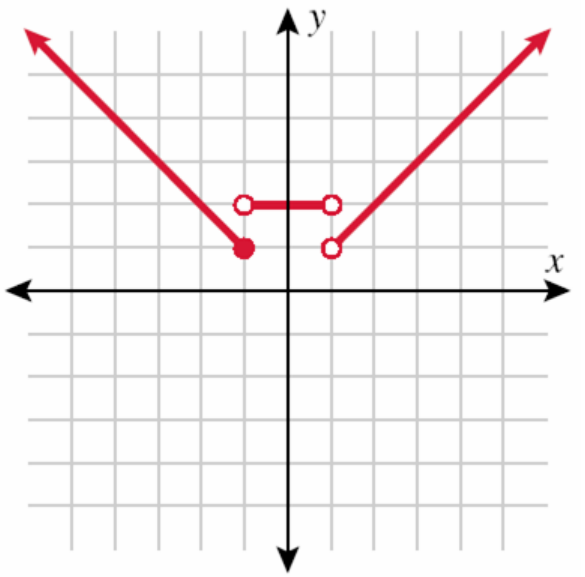
Question 2: Given the function $f(x) = \begin{cases} 3 & if\ x \leq -2 \\ x^2 & if\ -2 < x \leq 3 \\ -x+2 & if\ 3 < x \leq 7 \end{cases}$

then find the following

(a) Sketch the graph of $f(x)$

(b) Use the graph of $f(x)$ to find (1) the x-intercepts (2) the y-intercepts (3) the domain (4) the range (5) the intervals where $f(x)$ is (i) increasing (ii) decreasing (iii) constant (6) the intervals where $f(x)$ is (i) above x-axis (ii) below x-axis

Question 3: Give a rule for the piecewise-defined function below and give the domain and range. Also determine the intervals for which the function is continuous, increasing, decreasing and constant.



Question 4: If $f(x) = [\![3x - 2]\!],\ where\ [\![\ \ ]\!]$ is the greatest integer function, then the x- and y- intercepts are

(a) $\frac{3}{2} \leq x < 2\ , y = 2$

(b) $\frac{1}{3} \leq x < \frac{2}{3}\ , y = 2$

(c) $-\frac{2}{3} \leq x < 1\ , y = -2$

(d) $\frac{2}{3} \leq x < 1\ , y = -2$

(e) $\frac{1}{3} < x \leq \frac{2}{3}\ , y = 2$

Question 5: If $f(x) = \begin{cases} [\![1 - \frac{x}{3}]\!] & if\ x \leq -3 \\ 1 & if\ -3 < x < 0 \\ x^2 + 1 & if\ x > 1 \end{cases}$

(a) Find all the values of $\boldsymbol{x}$ when $f(x) = 2$

(b) Find the value of $f\left(-\frac{9}{2}\right) + f(-3) - 2f(-1.5) - 2f(2)$

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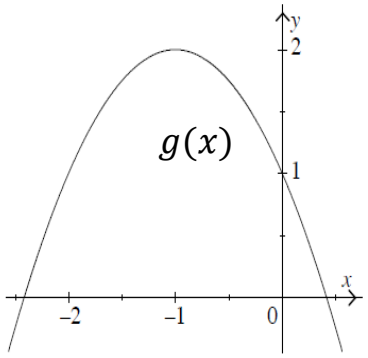
Prep-Year Math Program
Math (001)-Term (161)
Recitation (2.7)

Question 1: If the graph of the function $y = g(x)$ below is obtained by translating and reflecting the graph of $f(x) = x^2$



Then the function $g(x) =$

(a) $-f(x+1)+2$
(b) $-f(x+1)+1$
(c) $f(x-1)+2$
(d) $-f(x-1)+2$
(e) $f(x+1)+1$

Question 2:

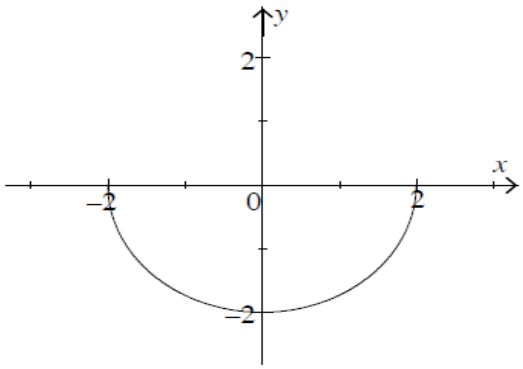
(a) Describe how the graph of $y = -2\sqrt{x+2} - 3$ can be obtained from the graph of $y = \sqrt{x-2} + 2$

(b) Obtain the function $f(x)$ from the graph $g(x) = |x|$ by translating $g(x)$ three units down, five units left, and then reflecting the graph across the x-axis.

(c) Obtain the function $g(x)$ from the graph $f(x) = x^2 - 2x + 1$ by reflecting $f(x)$ across the y-axis, shifting 2 unit right and 1 unit down, and then reflecting across the x-axis.

Question 3: If $f(-4) = 2$, then find the coordinates of the point that lie on the graph of $g(x) = -2f(-x-1) - 2$

Question 4: If the figure below is the graph of $y = f(x)$, then find the domain **D** and the range **R** of the function $g(x) = -\frac{1}{2} f\left(\frac{x}{2}\right)$.



Question 5: Which one of the following statement is TRUE

(a) $y^2 = |x + 1| - 3x^2$ is symmetric with respect to the origin
(b) $x^2 = |x - y|$ is symmetric with respect to the x – axis

(c) $|y| = \frac{|x+2|}{x^2}$ is symmetric with respect to the y – axis

(d) $|xy| + |x|y = 1$ is symmetric with respect to both the x-axis and the origin

(e) $y = 2x^2 - 3|x^5| + 5$ is an even function

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Math (001)-Term (161)
Recitation (2.8)

Question 1: If $f(x) = |x|$, $then\ find\ the\ value\ of\ \frac{f(-2+h)-f(-2)}{h}\ \ where\ h < 0$

Question 2: If $f(x) = x + k, \quad g(x) = [\![x]\!]$ and the graph of the function $(gof)(x)$ has y-intercept at 3, then find all the ***values*** of ***k***.

Question 3: If $f(x) = \ x + 4\ \ and\ \ (f \circ g)(x) = 12 + 8x + 2x^2$, then $\boldsymbol{g(2)} =$

(a) 4 (b) 6 (c) 36 (d) 40 (e) 32

Question 4: If $f(x) = \begin{cases} [\![1 - \frac{x}{3}]\!] & if\ x \leq -3 \\ 1 \quad if -3 < x < 0 \\ x^2 + 1 \quad if\ x \geq 0 \end{cases}$ and $g(x) = |1 + x|$

Then the value of $(f \circ f)\left(-\frac{7}{2}\right) + \left(\frac{f}{g}\right)\left(-\frac{7}{2}\right) =$

(a) $\frac{29}{5}$ (b) $\frac{26}{5}$ (c) $\frac{4}{5}$ (d) $\frac{39}{7}$ (e) $\frac{15}{2}$

Question 5:

(a) If $f(x) = \sqrt{9 - x^2}\ \ and\ \ g(x) = \ x^2 - 2x - 8$ then find the domain of $\left(\frac{f}{g}\right)(x)$

(b) Find the domain of $(f \circ g)(x)$, where $f(x) = \frac{x-1}{3-x}$ and $g(x) = \sqrt{x + 2}$

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Math (001)-Term (161)
Recitation (3.1)

Question 1: Find the axis, vertex, minimum or maximum value, domain, range, x-intercept, y-intercept, interval where $f(x)$ is increasing, decreasing, above x-axis, below x-axis and the graph of the following function:

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

(b) $f(x) = \frac{2}{3}x^2 - \frac{8}{3}x + \frac{5}{3}$

Question 2: The ***sum*** of the real coefficients **'a', 'b', 'c'** of the quadratic function $f(x) = ax^2 + bx + c$ that has ***only one*** x-intercept at -2 and y-intercept at 8 is

(a) 2

(b) 16

(c) 18

(d) 8

(e) -21

Question 3: If -3 is a zero of the quadratic function $f(x) = ax^2 + bx + c$ and its graph has lowest point $(-2, -2)$. What is the other zero of this quadratic function?

Question 4: Given the function $f(x) = x^2 + 4x + 2$ with domain $[-3, 0]$, then

the minimum and maximum values of $f(x)$ are respectively

(a) -2 *and no maximun value*

(b) $-6,\ 12$

(c) $-1,\ 1$

(d) $no\ minimum\ value, 2$

(e) $-2,\ 2$

Question 5: If $x = -3$ is the axis of symmetry of the parabola $f(x) = -2x^2 - 4cx - c^2 - 7$ for some constant c, then the maximum value of $f(x)$ is equal to

(a) 3 (b) 1 (c) -3 (d) No maximum value (e) 2

Question 6: If the slope of the line passing through $(2, -3)$ and the vertex of the parabola $y = (x + m)^2 - 5$ is $\frac{3}{m}$, then the parabola is increasing in the interval of

(a) $(-6, \infty)$

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

(c) $(6,\ \infty)$

(d) $(-5,\ \infty)$

(e) $(-\infty,\ 5)$

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Math (001)-Term (161)
Recitation (3.2)

Question 1: The sum of values of ***k,*** when $x^3 - 3x^2 + x - 1$ is divided by $x - k$ and having remainder 2 is

(a) 3 (b) i (c) $-i$ (d) $3 - i$ (e) $3 + i$

Question 2: The remainder when $P(x) = x^{105} - x^{10} - 2x + 1$ is divided by $x + i$ is

(a) $2 - i$ (b) $1 + 2i$ (c) $2 + i$ (d) -1 (e) $1 - i$

Question 3: If $x + 2$ is a factor of polynomial $P(x) = x^3 - kx^2 + 3x + 7k$, then K is equal to

(a) $\frac{10}{3}$ (b) $\frac{13}{3}$ (c) $\frac{11}{3}$ (d) $\frac{16}{3}$ (e) $\frac{14}{3}$

Question 4: If $P(x) = -x^3 + kx^2 - 5x - 20$ is divided by $x + 2$, then the set of all values of K which makes the remainder positive is

(a) $\left(\frac{9}{2}, \infty\right)$ (b) $\left(\frac{19}{2}, \infty\right)$ (c) $\left(\frac{11}{2}, \infty\right)$ (d) $\left(\frac{1}{2}, \infty\right)$ (e) $\emptyset$

Question 5: If 2 is zero of multiplicity 2 of $P(x) = x^4 + ax^3 + 8x^2 - 16x + b$ then find $\boldsymbol{a}$ *and* $\boldsymbol{b}$**.**

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Recitation (3.3)

Question 1: According to Descartes rule of signs, which of the following is ***false*** about the zeros of $P(x) = x^5 - x^4 + 2x^2 - x - 1$

(a) P(x) has three negative zeros, two nonreal complex zeros.

(b) P(x) has three positive zeros, two negative zeros.

(c) P(x) has three positive zeros, two nonreal complex zeros.

(d) P(x) has one positive zeros, two negative zeros, two nonreal complex zeros.

(e) P(x) has one positive zero, four nonreal complex zeros.

Question 2: If $-i$ is a zero of the polynomial $P(x) = x^4 - 4x^3 + 5x^2 - 4x + 4$

then the number of the $x - intercepts$ of the graph of $P(x)$ is equal to

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

Question 3: If $1 + i \; is \; a \; zero \; of \; P(x) = x^3 - x^2 - ix^2 - 16x + 16 + 16i,$ then find the **sum of all zeros** of $P(x) =$

(a) 0 (b) $1 + i$ (c) $1 - i$ (d) 4 (e) -4

Question 4: The total number of ***x-intercepts*** of the polynomial

$P(x) = x^5 + 6x^4 + 13x^3 + 14x^2 + 12x + 8$ is (are)

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

Question 5: The sum of all coefficients of polynomial function of least degree having only ***real coefficients*** with zeros $1 + i \; and \; -1 - i$ is

(a) 1 (b) 4 (c) 5 (d) 0 (e) 3

King Fahd University of Petroleum and Minerals
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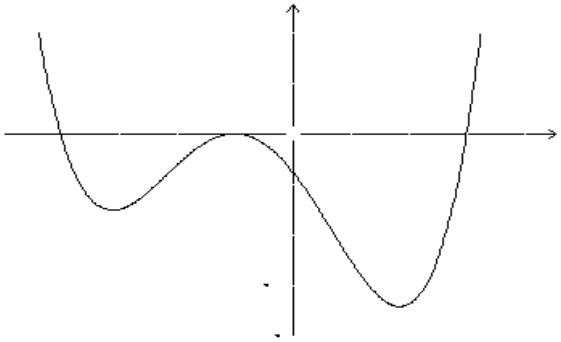
Recitation (3.4)

Question 1: If $f(x) = a(x+4)(x^2+2x+1)(3-x)$ has the graph below then a reasonable possible value to the leading coefficient ***a*** that will justify the end behavior (Far left and Far right behavior) of the graph is



(a) $a = -1$

(b) $a = 2$

(c) $a = 0$

(d) $a = 1$

(e) $a = {}^{1}/_{2}$

Question 2: The graph of the polynomial function

$f(x) = x^4 + 3x^3 - 9x^2 - 23x - 12$ goes:

(a) up to the left and down to right with at most 3 turning points

(b) down to left and down to right with at most 1 turning point

(c) up to left and up to right with at most 3 turning points

(d) down to left and up to right with at most 4 turning points

(e) up to left and up to right with at most 4 turning points

Question 3: Which one of the following polynomial has the graph given below?

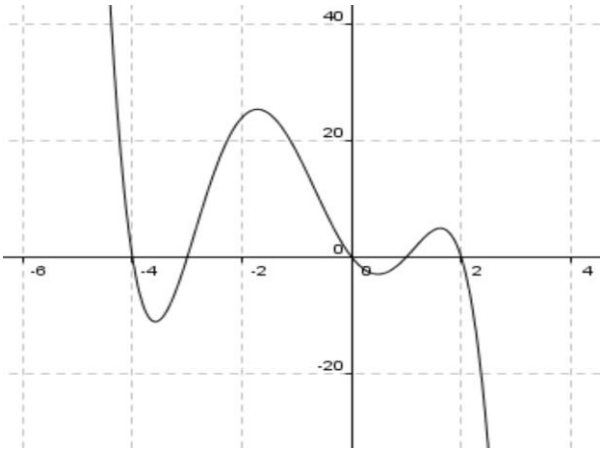
(a) $P(x) = \frac{1}{2}x(x-1)(x-2)(x+3)(x+4)$

(b) $P(x) = -\frac{1}{2}x(x-1)(x-2)(x+3)(x+4)$

(c) $P(x) = -\frac{1}{2}x(x-1)(x-2)(x+4)^2$

(d) $P(x) = \frac{1}{2}x(x-1)^2(x-2)(x+3)(x+4)$

(e) $P(x) = -\frac{1}{2}x(x-1)(x+2)(x+3)(x+4)$



Question 4: Which one of the following statements is TRUE about the graph of

The polynomial function $P(x) = x^3(x+2)(x-3)^2$

(a) the graph has four turning points

(b) the graph crosses the x-axis at three points

(c) the graph lies above x-axis in the interval $(-2, 0)$

(d) the graph has 6 x-intercepts

(e) the graph is tangent at $x = 0\ and\ x = 3$

Question 5: By the intermediate value theorem the polynomial

$P(x) = 3x^3 + 7x^2 + 3x + 7$

(a) $[0, 1]$

(b) $[-2, -1]$

(c) $[-1, 0]$

(d) $[1,\ 2\ ]$

(e) $[-3, -2]$

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Recitation (3.5)

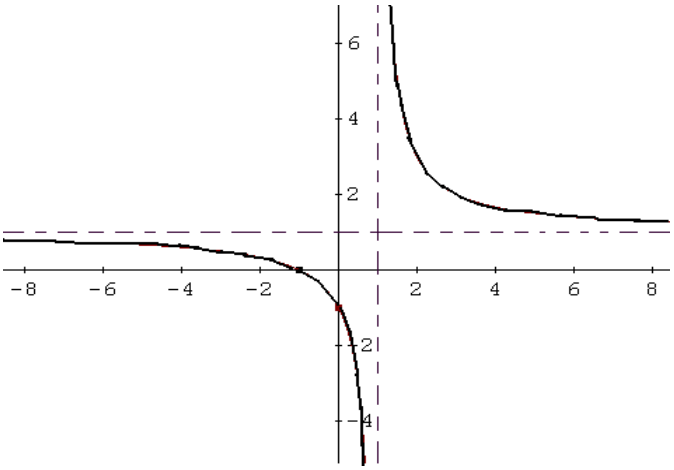
Question 1: If $y = \frac{2}{3}$ is the horizontal asymptote of the function $y = \frac{ax-5}{3x-4}$ then X-intercept of the graph is

(a) $\frac{4}{3}$ (b) $\frac{5}{2}$ (c) $\frac{5}{4}$ (d) $\frac{3}{2}$ (e) $-\frac{1}{2}$

Question 2: The graph of $y = \frac{x^2+3x-2}{2x^2+x+10}$ intersects its horizontal asymptote when x is equal to

$(a)\ \frac{14}{5}$ $(b)\ \frac{-1}{2}$ $(c)\ \frac{11}{5}$ $(d)\ -\frac{2}{5}$ $(e)\ \frac{19}{5}$

Question 3: The following figure represents the graph of



(a) $y = \frac{x}{x-1}$ $(b)\ y = \frac{x+1}{x-1}$ $(c)\ y = \frac{x-1}{x+1}$ $(d)\ y = \frac{2(x+1)}{x-1}$ $(e)\ y = \frac{x+2}{x-1}$

Question 4: If $(x) = \frac{ax+b}{cx+d}$, then find $a, b, c, and\ d$ given that Horizontal Asymptote = 3, Vertical Asymptote = 5, X-intercept = 2 and y-intercept = 6/5

Question 5: Let f be the function whose graph is obtained by translating the graph of $g(x) = \frac{1}{x}$ to the right 3 units and up 2 units.
(a) Write an equation for (x) as quotient of two polynomials.
(b) Determine the zeros of f.

(c) Identify the asymptotes of the graph of (x).
(d) What is the domain and range of (x)?

Question 6: The graph $y = \frac{6 - ax}{5 - (a-2)x}$ has a vertical asymptote at $= 5$, then it has a horizontal asymptote given by

(a) $y = \frac{1}{3}$
(b) $y = \frac{3}{2}$
(c) $y = 5$
(d) $y = \frac{6}{5}$
(e) $y = 3$

Question 7: Which one of the following statements is TRUE about the given original rational function $f(x) = \frac{1}{x-1} + 2$
(a) The graph has a hole at $x = 1$
(b) Domain of $f(x)$ has all real numbers except 2
(c) Range of $f(x)$ has all real numbers except 1
(d) $f(x)$ is increasing for all x in its domain
(e) The graph has a horizontal asymptote at $y = 2$