KFUPM – PREP MATH PROGRAM – MATH001 – TERM 241

3.1 Recitation Exercises

1. The sum of the real coefficients a, b and 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

2. 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?

3. If a ball is thrown up in the air and its height H, in meters, is a function of time t, in seconds, given by $H(t) = -16t^2 + 128t + 105$, then the time it will take the ball to reach its maximum height is

A) 4 seconds **B)** 8 seconds **C)** 2 seconds **D)** 1 second **E)** 16 seconds

4. If $x = -3$ is the axis of symmetry of the parabola $f(x) = -2x^2 - 4dx - d^2 - 7$ for some constant d, then the maximum value of $f(x)$ is equal to

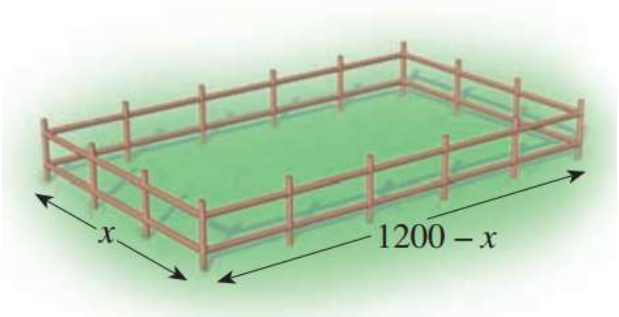
A) 3 **B)** 1 **C)** -3 **D)** no maximum value **E)** 2

5. If u and v are two integers such that $v - 2u = 8$ and the product uv is minimum, then find $u + v$.

6. Carol has 2400 ft of fencing to fence in a rectangular horse corral.

(a) Find a function that models the area of the corral in terms of the width x of the corral.

(b) Find the dimensions of the rectangle that maximize the area of the corral.



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3.2 Recitation Exercises

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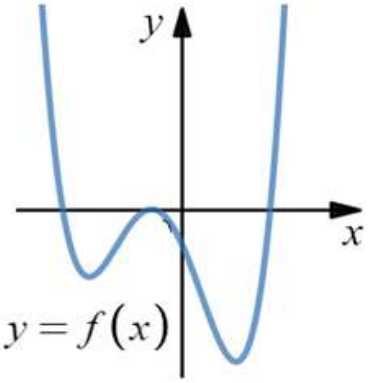
1. If $f(x) = a(x+4)(x^2+2x+1)(3-x)$ has the graph below then a reasonable possible value of the leading coefficient a that will justify the end behavior (far left and far right behavior) of the graph is



A) -1

B) 2

C) 0

D) 1

E) $\frac{1}{2}$

2. Sketch the graph of the following polynomials

a) $P(x) = x^4 - x^3 - 2x^2$.

b) $Q(x) = |x^4 - x^3 - 2x^2|$.

3. Which one of the following polynomials has the graph given below?

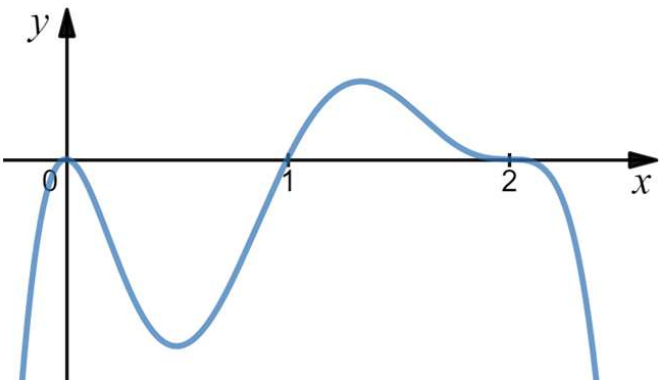
i. $y = 2x^2(x-1)(x-2)$

ii. $y = -2x^2(x-1)(x-2)$

iii. $y = -2x^2(x-1)^3(x-2)$

iv. $y = -2x^2(x-1)(x-2)$

v. $y = -2x(x-1)^3(x-2)$



4. Graph the polynomial $p(x) = x^3(x+2)(x-3)^2$ and find the interval(s) on which the function is below x-axis.

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3.3 Recitation Exercises

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1. When $x^3 - 3x^2 - x - 1$ is divided by $x - k$, and the remainder is -4, then the sum of all values of k is

A) 3 **B)** 1 **C)** -1 **D)** 0 **E)** 2

2. If $P(x) = x^{105} - x^{10} - 2x + 1$ is divided by $x + 1$, then the remainder is

A) 2 **B)** 1 **C)** -1 **D)** 0 **E)** -2

3. If $x + 2$ is a factor of the polynomial $P(x) = x^3 - kx^2 + 3x + 7k$, then $k =$

A) $\frac{10}{3}$ **B)** $\frac{13}{3}$ **C)** $\frac{11}{3}$ **D)** $\frac{16}{3}$ **E)** $\frac{14}{3}$

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)** $\emptyset$

5. If $\frac{2x^5+x^3-2x^2+3x-5}{x^2-3x+1} = Q(x) + \frac{R(x)}{x^2-3x+1}$, then what are $Q(x)$ and $R(x)$?

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3.4 Recitation Exercises

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1. According to Descartes rule of signs, which one of the following is **FALSE** about the zeros of the polynomial $P(x) = x^5 - x^4 + 2x^2 - x - 1$ **?** $P(x)$ has

A) three negative zeros and two non-real complex zeros.
B) three positive zeros and two negative zeros.
C) three positive zeros and two non-real complex zeros.
D) one positive zero, two negative zeros, and two non-real complex zeros.
E) one positive zero and four non-real complex zeros.

2. Find all rational zeros of $P(x) = x^3 - 7x^2 + 16x - 12$ and write it in factored form.

3. The sum of all real zeros of the polynomial $P(x) = 2x^4 + 15x^3 + 17x^2 + 3x - 1$ is

A) $-3 + \sqrt{10}$ **B)** $-\frac{3}{2}$ **C)** $-\frac{15}{2}$ **D)** $-3 - \sqrt{10}$ **E)** -7

4. The total number of the x-intercept(s) of the graph of the polynomial $P(x) = x^5 + 6x^4 + 13x^3 + 14x^2 + 12x + 8$ is

A) 0 **B)** 1 **C)** 2 **D)** 3 **E)** 4

5. Sketch the graph of the polynomial $P(x) = 2x^3 - 7x^2 + 2x + 3$.

6. List all **possible rational zeros** given by the Rational Zeros Theorem, for the polynomial $P(x) = 12x^5 + 6x^3 - 2x - 8$.

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3.5 Recitation Exercises

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1. If $-i$ is a zero of the polynomial $P(x) = x^4 - 4x^3 + 5x^2 - 4x + 4$, then the number of the x-intercept(s) of the graph of P is

A) 0 **B)** 1 **C)** 2 **D)** 3 **E)** 4

2. 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

3. Find all the zeros of the polynomial $P(x) = x^5 + x^3 + 8x^2 + 8$.

4. Find the polynomial of least degree for which $1 + i$ and $-1 - i$ are zeros and the y-intercept is -2 where the polynomial has:

a) Real coefficients.

b) Complex coefficients.

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3.6 Recitation Exercises

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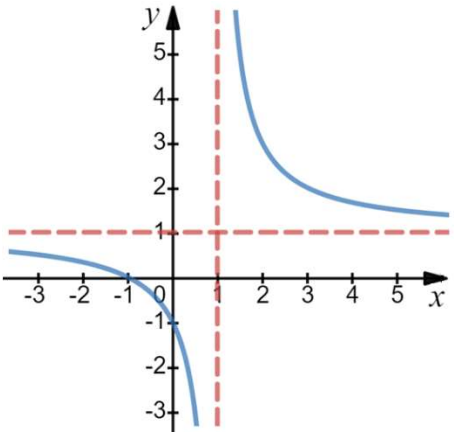
1. If $y = \frac{2}{3}$ is the horizontal asymptote of the function $y = \frac{ax-5}{3x-4}$, then the x-intercept of the graph is

A) $\frac{4}{3}$ **B)** $\frac{5}{2}$ **C)** $\frac{5}{4}$ **D)** $\frac{3}{2}$ **E)** $-\frac{1}{2}$

2. The graph of $y = \frac{x^2+3x-2}{2x^2+x+10}$ intersects its horizontal asymptote when x equals

A) $\frac{14}{3}$ **B)** $-\frac{1}{2}$ **C)** $\frac{11}{5}$ **D)** $-\frac{2}{3}$ **E)** $\frac{14}{5}$

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) $y = \frac{x+2}{x-1}$

4. The graph of $y = \frac{6-ax}{5-(a-2)x}$ has vertical asymptote $x = 5$, 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)** $y = 3$

5. Find all the asymptotes and holes, if any, for the graph of $f(x) = \frac{x^4-4x^2}{x^3-2x^2-4x+8}$.