This review is identical to the exam in format. Only the actual numerical values in the questions will vary.

#1-30: See multiple-choice packet.

Free-Response: (Total 40 points...exact points are listed in *italics* in each problem.) You must show a reasonable amount or work that leads to your answer. Where it is impossible to show work, explain the mental leaps that you made to draw your conclusion.

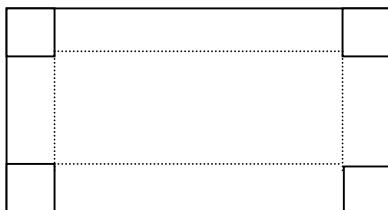**#31-35: Factor each polynomial completely.** *(17 points)*

#	Polynomial	Completely Factored Form (and work)
31	$64x^3 - 27$ *(2 points)*	
32	$-9x^3 - 30x^2 - 9x$ *(3 points)*	
33	$x^3 + 6x^4 - 4x - 24$ *(3 points)*	
34	$x^3 - 6x^2 + 11x - 6$ *(4 points)*	
35	$9x^4 - 9x^3 - 58x^2 + 4x + 24$ *(5 points)*	

#36-38: Use factoring, division, or graphing to solve. (*requires a graphing calculator to solve.) YOU MAY USE YOUR CALCULATOR TO HELP, BUT YOU MUST SHOW WORK BY HAND UNLESS PROBLEMS ARE MARKED WITH AN *. *(13 points total)*

#	Problem	Answer and work
36	$15x^3 - 25x^2 = 10x$ *(4 points)*	
37	$x^3 + 12x^2 = -21x - 10$ *(4 points)*	
38*	$-x^4 + 3x^3 + 5x^2 = 2x + 1$ *(5 points)*	

#39: Solve the word problem. *(10 points total)*

39. Tommy has a 6 x 9 in piece of cardboard. He plans to cut identical squares (x by x) out of each corner and then fold up the flaps to create a box without a lid. (See diagram.)

A.   Write an equation in standard form for the volume, V(x), of the box. *(3 points)*
B.* Jimmy wants the box to have a volume of 22 cubic inches. Use factoring, graphing, or division to find all possible values of x which will result in this volume. **(*Note: this portion requires the use of a graphing calculator.)** SHOW ALL WORK *(2 points)*
C. One of the answers to part B is not a logical choice (in fact, it is impossible.) Which answer does not make sense and why? *(2 points)*
D.* What x will yield the maximum volume for the box? What is the maximum volume? **(*Note: this portion requires the use of a graphing calculator.)** SHOW ALL WORK *(3 points)*

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Divide f(x) by d(x), and write a summary statement in the form indicated.

1) $f(x) = x^2 - 2x + 5$; $d(x) = x - 6$ (Write answer in fractional form)   1) _____

   A) $\dfrac{f(x)}{(x-6)} = (x-6) + \dfrac{29}{(x-6)}$ B) $\dfrac{f(x)}{(x-6)} = (x+4) + \dfrac{29}{(x-6)}$

   C) $\dfrac{f(x)}{(x-6)} = (x-6) + \dfrac{24}{(x-6)}$ D) $\dfrac{f(x)}{(x-6)} = (x+4) + \dfrac{24}{(x-6)}$

2) $f(x) = x^4 + 3x^3 + 6x^2 + 3x + 5$; $d(x) = x^2 + 1$ (Write answer in fractional form)   2) _____

   A) $\dfrac{f(x)}{(x^2+1)} = (x^2 - 3x + 5) + \dfrac{-20}{(x^2+1)}$ B) $\dfrac{f(x)}{(x^2+1)} = (x^2 + 3x + 5)$

   C) $\dfrac{f(x)}{(x^2+1)} = (x^2 - 3x + 5)$ D) $\dfrac{f(x)}{(x^2+1)} = (x^2 + 3x + 5) + \dfrac{-20}{(x^2+1)}$

Divide using synthetic division, and write a summary statement in fraction form.

3) $\dfrac{2x^4 - x^3 - 15x^2 + 3x}{x + 3}$ 3) _____

   A) $2x^3 - 7x^2 + 6x + 15 + \dfrac{45}{x+3}$ B) $2x^3 - 5x^2 + 3 + \dfrac{9}{x+3}$

   C) $2x^3 - 7x^2 + 6x - 15 + \dfrac{45}{x+3}$ D) $2x^3 + 5x^2 + 3 + \dfrac{9}{x+3}$

4) $\dfrac{2x^5 - x^4 + 3x^2 - x + 5}{x - 1}$ 4) _____

   A)

      $2x^4 + x^3 + x^2 + 4x + 3 + \dfrac{8}{x-1}$ B)

                                         $2x^4 + x^3 - x^2 + 2x + 1 + \dfrac{6}{x-1}$

   C)

      $2x^4 + x^3 + 4x^2 + 3x + \dfrac{8}{x-1}$ D)

                                         $2x^4 - 3x^3 - x + \dfrac{6}{x-1}$

5) $\dfrac{2x^3 + 3x^2 + 4x - 10}{x + 1}$ 5) _____

   A) $2x^2 + 5x + 9 + \dfrac{1}{x+1}$ B) $2x^2 + x + 3 + \dfrac{13}{x+1}$

   C) $2x^2 + 5x + 9 + \dfrac{-1}{x+1}$ D) $2x^2 + x + 3 + \dfrac{-13}{x+1}$

Find the zeros of the function.

6) $f(x) = x^2 + 3x + 2$

    A) –1 and –2   B) 1 and –2   C) –1 and 2   D) 1 and 2

6) _____

7) $f(x) = 3x^2 - 11x - 4$

    A) $\frac{1}{3}$ and 4   B) –3 and 4   C) $-\frac{1}{3}$ and 4   D) $-\frac{1}{3}$ and –4

7) _____

8) $f(x) = x^3 - 36x$

    A) 6 and –6   B) 0 and 6   C) 0, 6, and –6   D) 1, 6, and –6

8) _____

9) $f(x) = 3x^3 + 5x^2 - 2x$

    A) $\frac{1}{3}$ and –2   B) $\frac{1}{3}$ and 2   C) 0, $\frac{1}{3}$, and –2   D) 0, $\frac{1}{3}$, and 2

9) _____

10) $f(x) = x^3 + 10x^2 + 31x + 30$

    A) 0, 3, 5, and 2   B) –1, –5, and –2   C) 3, 5, and 2   D) –3, –5, and –2

10) _____

Find the zeros of the polynomial function and state the multiplicity of each.

11) $f(x) = (x + 4)^2(x - 1)$

    A) –4, multiplicity 1; 1, multiplicity 2   B) –4, multiplicity 2; 1, multiplicity 1
    C) –4, multiplicity 1; 1, multiplicity 1   D) 4, multiplicity 2; 1, multiplicity 1

11) _____

12) $f(x) = 2(x + 8)^2(x - 8)^3$

    A) 4, multiplicity 1; 8, multiplicity 1; –8, multiplicity 1
    B) –8, multiplicity 2; 8, multiplicity 3
    C) 4, multiplicity 1; –8, multiplicity 3; 8, multiplicity 3
    D) –8, multiplicity 3; 8, multiplicity 2
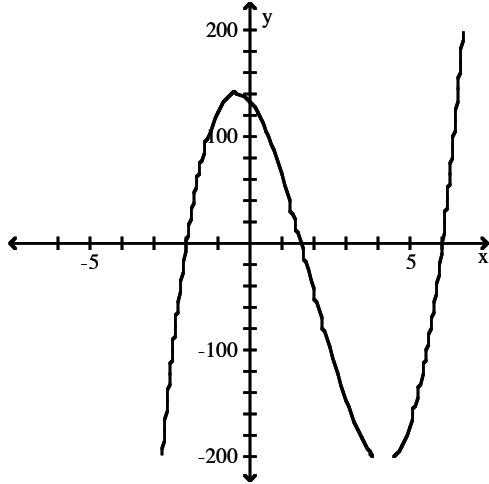
12) _____

Solve the problem.

13) A rectangular piece of cardboard measuring 17 inches by 44 inches is to be made into a box with an open top by cutting equal size squares from each corner and folding up the sides. Let x represent the length of a side of each such square. For what value of x will the volume be a maximum? If necessary, round to 2 decimal places.

    A) 33.14   B) 19.25   C) 3.76   D) 16.57

13) _____

14) The polynomial function $I(t) = -.1t^2 + 1.2t$ represents the yearly income (or loss) from a real estate investment, where t is time in years. After how many years does income begin to decline? Round to the nearest tenth of a year, if necessary.

    A) 8 years   B) 12 years   C) 6 years   D) 5 years

14) _____

Use the graph to guess possible linear factors of f(x). Then completely factor f(x) with the aid of synthetic division.

15) $f(x) = 7x^3 - 39x^2 - 40x + 132$

15) _____

A) $f(x) = (x + 2)(x - 6)(7x - 11)$
C) $f(x) = (x - 2)(x + 6)(7x + 13)$

B) $f(x) = (x + 2)(x - 6)(7x - 13)$
D) $f(x) = (x - 2)(x + 6)(7x + 11)$

Find the requested function.

16) Find the polynomial function with leading coefficient 3 ; degree 3; and -3, 4, and $\frac{2}{3}$ as zeros.

16) _____

A) $f(x) = 3x^3 + 5x^2 - 34x - 24$
C) $f(x) = 3x^3 - 5x^2 - 34x + 24$

B) $f(x) = 3x^3 + 5x^2 - 21x - 36$
D) $f(x) = 3x^3 - 5x^2 - 21x + 36$

17) Find the polynomial function with leading coefficient 4; degree 3; and -4, 2, and 5 as zeros.

17) _____

A) $f(x) = (x + 4)(x - 2)(x - 5)$
C) $f(x) = (x - 4)(x + 2)(x + 5)$

B) $f(x) = 4(x + 4)(x - 2)(x - 5)$
D) $f(x) = 4(x - 4)(x + 2)(x + 5)$

Use the Rational Zeros Theorem to write a list of all potential rational zeros

18) $f(x) = 2x^3 + 6x^2 + 11x - 8$

18) _____

A) $\pm 1, \pm 1/2, \pm 2, \pm 4, \pm 8$
C) $\pm 1, \pm 2, \pm 4$

B) $\pm 1, \pm 2, \pm 4, \pm 8$
D) $\pm 1, \pm 1/2, \pm 1/4, \pm 1/8, \pm 2$

19) $f(x) = 2x^3 - 5x^2 + 7x - 3$

19) _____

A) $\pm 1, \pm 1/3, \pm 2, \pm 2/3$
C) $\pm 1, \pm 2, \pm 3$

B) $\pm 1, \pm 2, \pm 3, \pm 3/2$
D) $\pm 1, \pm 3, \pm 1/2, \pm 3/2$

If the following is a polynomial function, then state its degree and leading coefficient. If it is not, then state this fact.

20) $f(x) = 6x^5 + 9x - 9$

20) _____

A) Degree: 6; leading coefficient: 5
C) Degree: 6; leading coefficient: 6

B) Degree: 5; leading coefficient: 6
D) Not a polynomial function.

21) $f(x) = 7 + 19x^4 - 18x + 14x^3 + 11x^2$

21) _____

A) Degree: 4; leading coefficient: 7
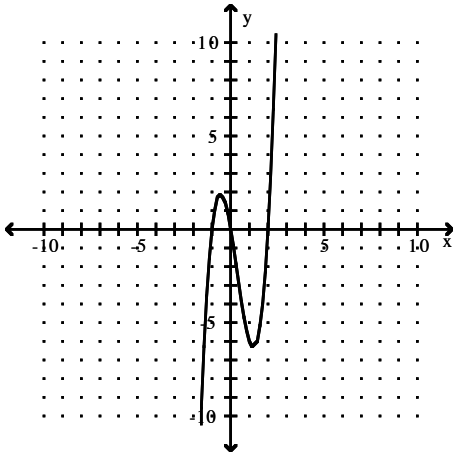C) Degree: 7; leading coefficient: 19

B) Not a polynomial function.
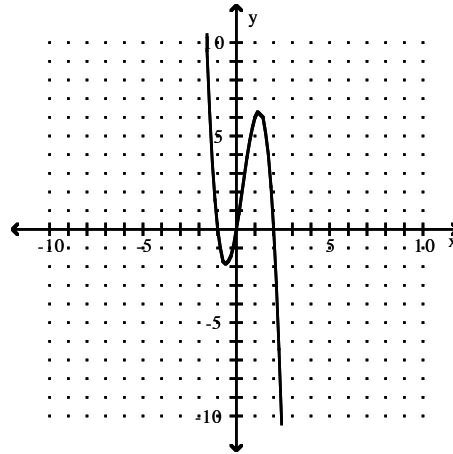D) Degree: 4; leading coefficient: 19

3

Graph the function.

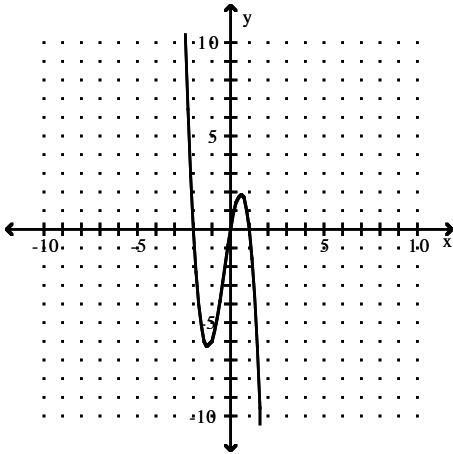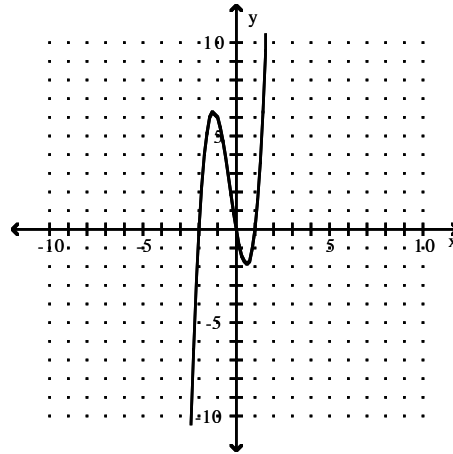22) $P(x) = -3x(x - 1)(x + 2)$

22) _____

A)

B)

C)

D)

Use a graphing calculator to approximate the real zeros of the function defined by f(x). Express decimal approximations to the nearest hundredth.

23) $f(x) = 5x^4 + 10x^3 - 5x^2 + 5x + 1$

23) _____

A) −5.08, 0.16　　　　　　　　　　　　B) No real solution
C) −2.54, −0.16　　　　　　　　　　　D) 0.16

24) $f(x) = 3x^4 + 6x^3 + 3x^2 - 3x + 1$

24) _____

A) −2.53, −0.25　　　　　　　　　　　B) 0.25
C) No real solution　　　　　　　　　D) −5.06, 0.25

25) $f(x) = -\sqrt{5}x^3 + \sqrt{3}x + \sqrt{11}$

25) _____

A) 1.36　　　　　B) No real zeros　　　　C) 1.54　　　　D) 1.57, −1.57

Describe the end behavior of the polynomial function by finding $\lim\limits_{x \to \infty} f(x)$ and $\lim\limits_{x \to -\infty} f(x)$.

26) $f(x) = 5x^4 + 7x^2 + 2$

26) _____

A) $\infty, -\infty$　　　　　B) $-\infty, -\infty$　　　　C) ∞, ∞　　　　D) $-\infty, \infty$

4

27) $f(x) = (x - 3)(1 - x)(3x - 5)$ 27) _____
    A) ∞, ∞ B) $-\infty, \infty$ C) $-\infty, -\infty$ D) $\infty, -\infty$

28) $f(x) = -5x4 + 7x2 + 9$ 28) _____
    A) $-\infty, \infty$ B) $\infty, -\infty$ C) $-\infty, -\infty$ D) ∞, ∞

29) $f(x) = x3 - 2x2 + 2x + 8$ 29) _____
    A) ∞, ∞ B) $\infty, -\infty$ C) $-\infty, \infty$ D) $-\infty, -\infty$

Find the zeros of the polynomial function and state the multiplicity of each.

30) $f(x) = -5x^2(x - 7)(x + 1)^3$ 30) _____
    A) –1, multiplicity 1; 1, multiplicity 1; 7, multiplicity 1
    B) –1, multiplicity 3; 0, multiplicity 2; 7, multiplicity 1
    C) –1, multiplicity 3; 7, multiplicity 1
    D) –1, multiplicity 3; 0, multiplicity 2; 1, multiplicity 1; 7, multiplicity 1

1) B
2) B
3) C
4) A
5) D
6) A
7) C
8) C
9) C
10) D
11) B
12) B
13) C
14) C
15) A
16) C
17) B
18) A
19) D
20) B
21) D
22) C
23) C
24) C
25) A
26) C
27) B
28) C
29) B
30) B