Name:_____ Adv. Alg. Fall BM 2 Review

Date:_____

Add or Subtract. Write the polynomial in standard form. Identify the leading coefficient, degree, and number of terms. Name the polynomial

1) $(3x^4 - 6x^2 + 8) - (-5x^4 + x^2 - 10)$

Standard Form: $8x^4 - 7x^2 + 18$

Leading Coefficient: 8

Degree: 4

Number of Terms: 3

Name: quartic trinomial

2) $(-2x^3 + 3x^5 - 3) + (4x^2 + 3x^3 + 12x^5)$

Standard Form: $15x^5 + x^3 + 4x^2 - 3$

Leading Coefficient: 15

Degree: 5

Number of Terms: 4

Name: quintic polynomial

Identify the degree of the following monomials:

3) $3x^5y^2$ 7

4) 9 0

5) x^{10} 10

Expand the expressions.

6) $(x-2)^5$

$1\ x^5\ 2^0 = x^5$
$5\ x^4\ 2^1 = -10x^4$
$10\ x^3\ 2^2 = 40x^3$
$10\ x^2\ 2^3 = -80x^2$
$5\ x^1\ 2^4 = 80x$
$1\ x^0\ 2^5 = -32$

$x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32$

7) $(x+y)^3$

$1\ x^3\ y^0 = x^3$
$3\ x^2\ y^1 = 3x^2y$
$3\ x^1\ y^2 = 3xy^2$
$1\ x^0\ y^3 = y^3$

$x^3 + 3x^2y + 3xy^2 + y^3$

Divide the following polynomials by the method of your choice.

8) $(3x^3 + 9x^2 - 14) \div (x+2)$

$-2 \mid 3\ \ 9\ \ 0\ \ -14$
$\quad\ \ \downarrow\ \ -6\ \ -6\ \ 12$
$\quad\ \ 3\ \ 3\ \ -6\ \ |-2$

$3x^2 + 3x - 6 + \frac{-2}{x+2}$

9) $(15x^3 - 16x^2 + x - 2) \div (x-2)$

$2 \mid 15\ \ -16\ \ 1\ \ -2$
$\quad\ \ \downarrow\ \ 30\ \ 28\ \ 58$
$\quad\ \ 15\ \ 14\ \ 29\ \ |56$

$15x^2 + 14x + 29 + \frac{56}{x-2}$

Simplify the following radicals.

10) $2\sqrt{-200}$

$2\sqrt{100}$ (10 10)

$20i\sqrt{2}$

11) $-3\sqrt{-32}$

$16\sqrt{2}$ (4 4)

$-12i\sqrt{2}$

12) $\sqrt{\frac{72}{144}}$ $72 < 36\ 2$ (6 6)

$\frac{6\sqrt{2}}{12} = \frac{\sqrt{2}}{2}$

Simplify the following expressions.

13) $(3+4i)(1-6i)$

$3-18i+4i-24i^2$

$\boxed{27-14i}$

14) $(5-12i)-4(3-i)$

$5-12i-12+4i$

$\boxed{-7-8i}$

15) $\frac{3+5i}{4-2i} \cdot \frac{4+2i}{4+2i} = \frac{12+6i+20i+10i^2}{16+8i-8i-4i^2}$

$= \frac{2+26i}{20} = \boxed{\frac{1+13i}{10}}$

16) $\frac{-i}{6+5i} \cdot \frac{6-5i}{6-5i} = \frac{-6i+5i^2}{36-30i+30i+25i^2}$

$= \boxed{\frac{-5-6i}{61}}$

Simplify using powers of i.

17) $i^{36} - 3i^{18} - 10i^{47}$

$1-3(-1)-10(-i)$

$1+3+10i$

$\boxed{4+10i}$

18) $2i^{13} + 4i^{42}$

$2i+4(-1)$

$\boxed{-4+2i}$

For questions 21-24, write the EQUATION of a polynomial using the given roots.

19) *Roots* $= -2$ (*mult of* 2), -8

$(x+2)(x+2)(x+8)=0$

$(x^2+4x+4)(x+8)=0$

$x^3+8x^2+4x^2+32x+4x+32=0$

$\boxed{x^3+12x^2+36x+32=0}$

20) *Roots* $= 2,\ 3,\ 0$ (*mult of* 2)

$x^2(x-2)(x-3)=0$

$(x^3-2x^2)(x-3)=0$

$x^4-3x^3-2x^3+6x^2=0$

$\boxed{x^4-5x^3+6x^2=0}$

21) *Roots* $= \frac{4}{3}, -5$

$(3x-4)(x+5)=0$

$3x^2+15x-4x-20=0$

$\boxed{3x^2+11x-20=0}$

22) *Roots* $= 6, \pm 4$

$(x-6)(x+4)(x-4)=0$

$(x-6)(x^2-16)=0$

$\boxed{x^3-6x^2-16x+96=0}$

Determine the End Behavior of the following functions.

23) $f(x) = x^4 - 3x^3 - 14x^2 + 12x + 40$

As $x \to -\infty, f(x) \to \infty$

As $x \to \infty, f(x) \to \infty$

24) $f(x) = -x^7 + 18x^5 - 81x^3$

As $x \to -\infty, f(x) \to \infty$

As $x \to \infty, f(x) \to -\infty$

25) $f(x) = x^5 - 37x^3 + 24x^2 + 180x$

As $x \to -\infty, f(x) \to -\infty$

As $x \to \infty, f(x) \to \infty$

26) $f(x) = -x^4 + 13x^2 - 36$

As $x \to -\infty, f(x) \to -\infty$

As $x \to \infty, f(x) \to -\infty$

Solve the following by FACTORING.

27) $4x^3 - 16x^2 - 180x = 0$

$4x(x^2 - 4x - 45) = 0$

$4x(x-9)(x+5) = 0$

$x = 0, 9, -5$

28) $4x^3 + 4x^2 = -x$

$4x^3 + 4x^2 + x = 0$

$x(4x^2 + 4x + 1) = 0$

$(4x^2 + 2x) + (2x + 1)$

$2x(2x+1)\ 1(2x+1)$

$x(2x+1)(2x+1) = 0$

$x = 0, -1/2$ mult. of 2

29) $x^2 + 7x = -10$

$x^2 + 7x + 10 = 0$

$(x+2)(x+5) = 0$

$x = -2, -5$

30) $10x^3 + 2x^2 - 70x = 14$

$10x^3 + 2x^2 - 70x - 14 = 0$

$2(5x^3 + x^2)(-35x - 7) = 0$

$x^2(5x+1) - 7(5x+1)$

$2(x^2 - 7)(5x+1) = 0$

$x^2 - 7 = 0$ $\quad$ $5x + 1 = 0$

$x^2 = 7$

$x = \pm\sqrt{7}$ $\quad$ $x = -1/5$

Solve the following by THE QUADRATIC FORMULA.

31) $x^2 - 6x + 7 = 0$

$x = \dfrac{6 \pm \sqrt{36 - 4(1)(7)}}{2(1)}$

$= \dfrac{6 \pm \sqrt{8}}{2} = \dfrac{6 \pm 2\sqrt{2}}{2} = 3 \pm \sqrt{2}$

32) $2x^2 + 3x - 4 = 0$

$x = \dfrac{-3 \pm \sqrt{9 - 4(2)(-4)}}{2(2)} = \dfrac{-3 \pm \sqrt{41}}{4}$

33) $x^2 + x + 2 = 0$

$x = \dfrac{-1 \pm \sqrt{1 - 4(1)(2)}}{2(1)} = \dfrac{-1 \pm \sqrt{-7}}{2}$

$= \dfrac{-1 \pm i\sqrt{7}}{2}$

Solve the following variation problems.

34) The cost of packing boxes, *c*, varies inversely with the number of boxes, *b*, purchased. If *c=$0.85* when *b=50*, determine the cost of packing 8 boxes.

$C = \frac{k}{b}$ $\quad C = \frac{42.5}{b}$

$.85 = \frac{k}{50}$ $\quad C = \frac{42.5}{8}$

$k = 42.5$ $\quad = \boxed{\$5.31}$

35) Hooke's law states that the distance d that a spring is stretched by a hanging object varies directly as the mass m of the object. If the distance is 30 cm when the mass is 6 kg, what is the distance when the mass is 8 kg?

$d = km$ $\quad d = 5m$

$30 = k(6)$ $\quad d = 5(8)$

$k = 5$ $\quad = \boxed{40\text{ cm}}$

36) The cost c of materials for a deck varies jointly with the width w and the length l. If c = $470.40 when w = 12 and l = 16 , find the cost when w = 10 and l = 25.

$C = kwl$ $\quad C = 2.45wl$

$470.4 = k(12)(16)$ $\quad C = 2.45(10)(25)$

$\frac{470.4}{192} = \frac{k(192)}{192}$ $\quad = \boxed{\$612.50}$

$k = 2.45$

37) The time required to process a shipment of goods at Wal-Mart varies directly with the number of items in the shipment and inversely with the number of workers assigned. If 15,000 items can be processed by 8 workers in 10 hours, then how long would it take 12 workers to process 20,000 items?

$t = \frac{kI}{w}$ $\quad 10 = \frac{k(15000)}{8}$ $\quad t = \frac{.005I}{w}$

$80 = k(15000)$ $\quad t = \frac{.005(20000)}{12}$

$k = .005$ $\quad \approx \boxed{8.33\text{hrs}}$

Simplify the following rational expressions and list the undefined values of each.

1) $\frac{10m-50}{m^2+4m-45}$ $\quad \frac{10(m-5)}{(m+9)(m-5)} = \boxed{\frac{10}{m+9}}$ $\quad \boxed{m \neq -9, 5}$

2) $\frac{2x^2-18x}{x^2+x-90} = \frac{2x(x-9)}{(x+10)(x-9)} = \boxed{\frac{2x}{x+10}}$ $\quad \boxed{x \neq -10, 9}$

3) $\frac{k^2-10k+21}{8k^2-56k} = \frac{(k-7)(k-3)}{8k(k-7)} = \boxed{\frac{k-3}{8k}}$ $\quad \boxed{k \neq 0, 7}$

4) $\frac{10p-40}{p^2+p-20} = \frac{10(p-4)}{(p+5)(p-4)} = \boxed{\frac{10}{p+5}}$ $\quad \boxed{p \neq -5, 4}$

Multiply or Divide the Rational Expressions.

5) $\frac{p^2-2p-80}{9p^3-90p^2} \div \frac{1}{9p^2}$

$\frac{(p-10)(p+8)}{9p^2(p-10)} \cdot \frac{9p^2}{1} = \boxed{p+8}$

6) $\frac{b^2-2b-3}{4} \cdot \frac{1}{b-3} = \frac{(b-3)(b+1)}{4} = \boxed{\frac{b+1}{4}}$

7) $\frac{x+2}{x+9} \div \frac{x+2}{x^2+7x+10}$

$\frac{x+2}{x+9} \cdot \frac{(x+5)(x+2)}{x+2} = \boxed{\frac{(x+2)(x+5)}{x+9}}$

8) $\frac{x-3}{x^2-11x+28} \cdot \frac{x^2-8x+16}{x-3} = \frac{(x-4)(x-4)}{(x-4)(x-7)} = \boxed{\frac{x-4}{x-7}}$

9) $\frac{6v^2}{v+8} \div \frac{v-10}{v^2+16v+64}$

$\frac{6v^2}{v+8} \cdot \frac{(v+8)(v+8)}{v-10}$

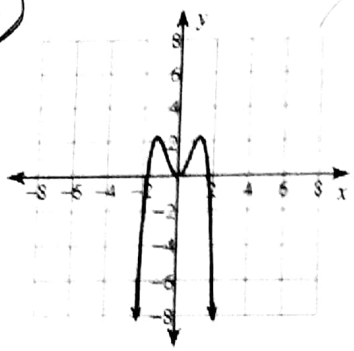
$\boxed{\frac{6v^2(v+8)}{v-10}}$

10) $\frac{r-1}{r+1} \cdot \frac{r^2+2r-35}{r+7} = \frac{(r+7)(r-5)}{r+1} = \boxed{\frac{(r-1)(r-5)}{r+1}}$

Choose the graph that represents the function. Determine the end behavior, y-intercept, and local max/min for each function.

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

A)



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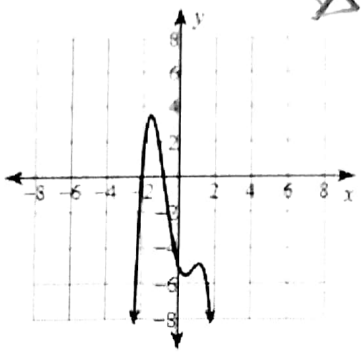


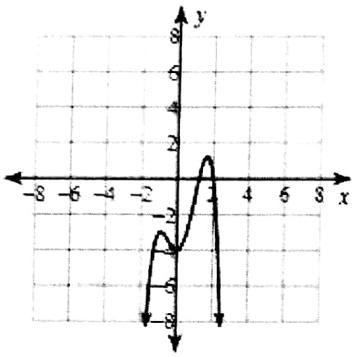
EB: As $x \to -\infty, f(x) \to -\infty$
As $x \to \infty, f(x) \to -\infty$

y-int: (0,0)

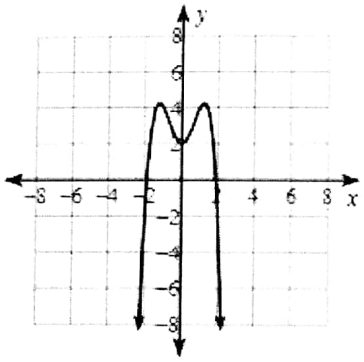
Lmax: (-1,2) (1,2)

Lmin: (0,0)

C)

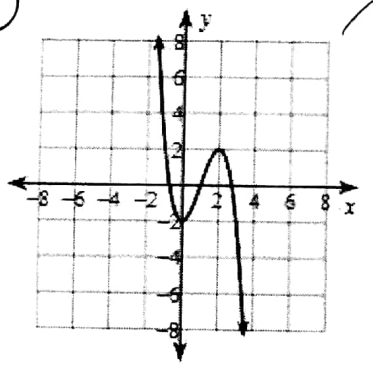


D)



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

A)



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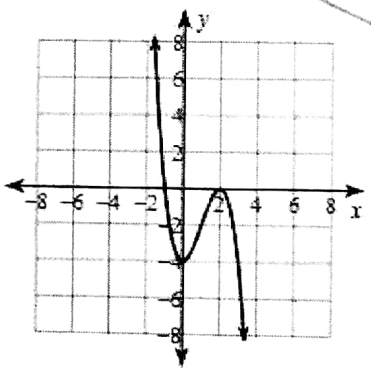


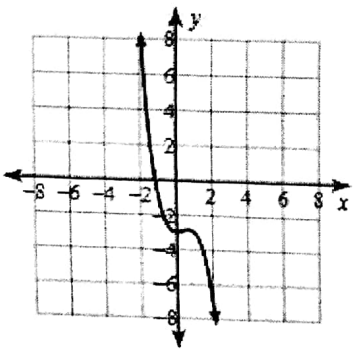
EB: As $x \to -\infty, f(x) \to \infty$
As $x \to \infty, f(x) \to -\infty$

y-int: (0,-2)

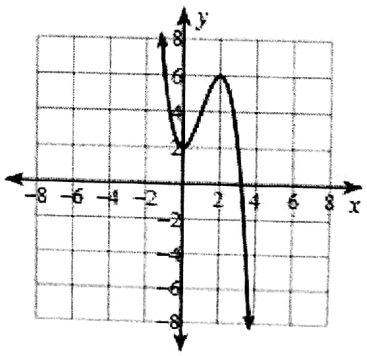
Lmax: (2,2)

Lmin: (0,-2)

C)

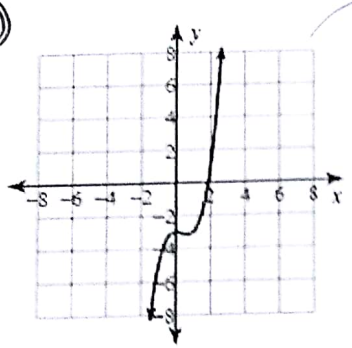


D)



13) $f(x) = x^3 - x^2 - 3$

A)



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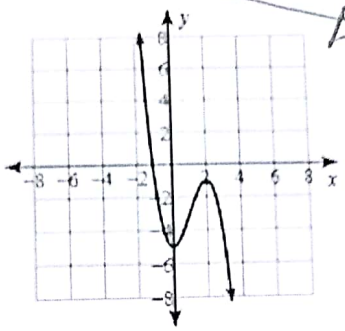

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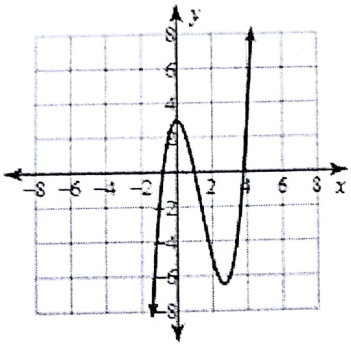
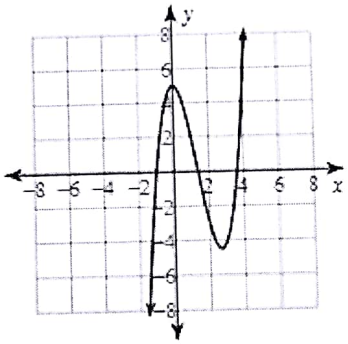


D)



EB: As $x \to -\infty, f(x) \to -\infty$
As $x \to \infty, f(x) \to \infty$

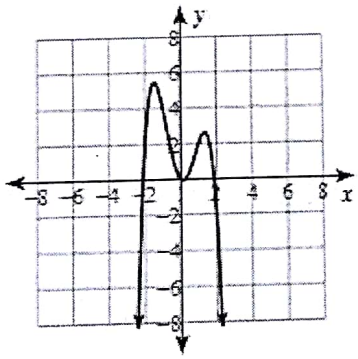
y-int: (0, -3)

Lmax: (0, -3)

Lmin: (.5, -3.1)

14) $f(x) = x^4 - x^3 - 3x^2 + 4$

A)



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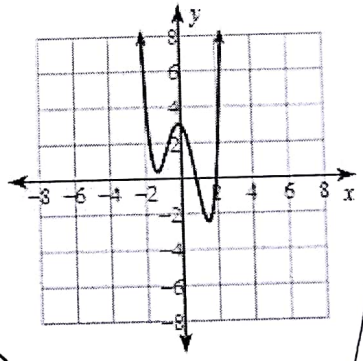

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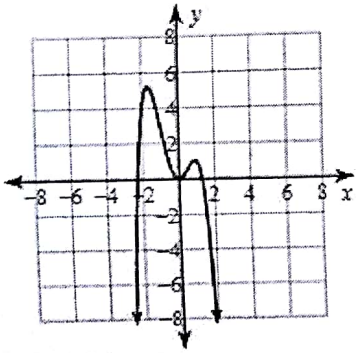

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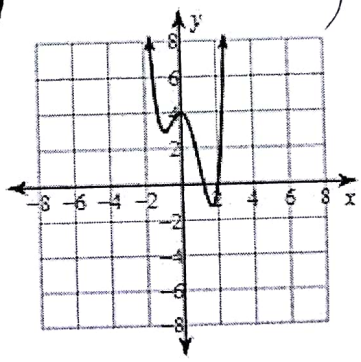

EB: As $x \to -\infty, f(x) \to \infty$
As $x \to \infty, f(x) \to \infty$

y-int: (0, 4)

Lmax: (0, 4)

Lmin: (-.5, 3)
(1.8, -1.5)