Unit 1 Review Problems Algebra II

Name KEY

Simplify each expression:

1. $\sqrt{48}$

$4\sqrt{3}$

2. $\sqrt{75}$

$5\sqrt{3}$

3. $\sqrt{162}$

$9\sqrt{2}$

4. $2x^3 \cdot 3x^7$

$6x^{10}$

5. $\frac{4x^5y^3}{3x^2y}$

$\frac{4x^3y^2}{3}$

6. $(2ab^2c^3)^3$

$8a^3b^6c^9$

7. $\sqrt{-18}$

$3i\sqrt{2}$

8. $\sqrt{-49}$

$7i$

9. $(4i-3)+(2-i)$

$-1+3i$

10. $(3+2i)-(5-6i)$

$-2+8i$

11. $2i(6-i)$

$2+12i$

12. $(2i+3)(3i-5)$

$-21-i$

Factor each polynomial:

13) $-2xy-2x$

$-2x(y+1)$

14) $2x^3+10x$

$2x(x^2+5)$

15) $x^2+10x+25$

$(x+5)(x+5)$

16) $x^2-3x-54$

$(x-9)(x+6)$

11) $x^2-8x+12$

$(x-6)(x-2)$

12) x^2-25

$(x+5)(x-5)$

13) $3x^2-14x-5$ $\quad -15$, $-15, 1$

$(3x^2-15x)+(1x-5)$

$3x(x-5)+1(x-5)$

$(3x+1)(x-5)$

14) $4x^2+8x+3$ $\quad 12$, $6, 2$

$(4x^2+6x)+(2x+3)$

$2x(2x+3)+1(2x+3)$

$(2x+1)(2x+3)$

15) x^3+343

$=(x+7)(x^2-14x+49)$

Solve each quadratic equation by factoring:

16) $x^2 - 25 = 0$

$x = 5, -5$

17) $x^2 - 2x - 24 = 0$

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

$x = 6, -4$

18) $4x^2 - 15 = -7x$

$x = -3, \frac{5}{4}$

$4x^2 + 7x - 15$

$(4x^2 + 12x) + (-5x - 15)$

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

-60

$12, -5$

Solve by quadratic formula.

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

19) $2x^2 - x - 6 = 0$

$\frac{1 \pm \sqrt{49}}{4} = 2, -\frac{3}{2}$

20) $x^2 + 13x + 7 = 0$

$\frac{-13 \pm \sqrt{141}}{2} =$

Algebra 2 Unit 2 Midterm Review Name Key

- Adding polynomials – combine like terms

Ex. $(3x^3 + x^2 - 5) + (4x^3 + 7x + 8) = \underline{7x^3 + x^2 + 7x + 3}$

- Subtracting polynomials – distribute negative and combine like terms

Ex. $(4x^3 + 2x^2 - 5x + 2) - (2x^3 + 3x + 8) = 4x^3 + 2x^2 - 5x + 2 - 2x^3 - 3x - 8 = \underline{2x^3 + 2x^2 - 8x - 8}$

- Multiplying Polynomials

Distribute all terms to all terms. Multiply coefficients and add exponents.

Ex. $2x(x - 3) = \underline{2x^2 - 6x}$

Ex. $(x - 3)(x + 6) = x^2 + 6x - 3x - 18 = \underline{x^2 + 3x - 18}$

Ex. $(x - 1)(2x^2 + 2x - 7) = 2x^3 + 2x^2 - 7x - 2x^2 - 2x + 7 = \underline{2x^3 - 9x + 7}$

- Dividing Polynomials

You will only have to do synthetic division! We know how to do synthetic division.

- Combination with a value

Plug the number in to each function and then perform the given operation (add, subtract, multiply or divide)

- Composition

$f(g(x))$ means to plug g(x) into f(x)

If there's a number plug it in to the inside function first and then take the new number and plug it into the outside function.

- Inverse

1. switch x and y

2. solve for y (get the y by itself)

Add or subtract.

1. $(5x + 2) + (x - 3)$

$6x - 1$

2. $(x^2 - 5) - (x + 4)$

$x^2 - x - 9$

3. $(5x^2 - 6x + 10) - (9x^2 - 4x + 3)$

$-4x^2 - 2x + 7$

4. $(5x^2 - 15x - 13) + (9x^2 - 4x - 6)$

$14x^2 - 19x - 19$

5. $(x^3 + 2x^2 - 7x + 4) + (4x^3 - 5x^2 - 2x - 8)$

$5x^3 - 3x^2 - 9x - 4$

6. $(x^3 - 3x^2 + 4) - (2x^2 - 8x + 6)$

$x^3 - 5x^2 + 8x - 2$

Algebra 2 Unit 2 Midterm Review Name_____

Multiply.

7. $(x+2)(x-5)$

$x^2-3x-10$

8. $2x(8x-5)$

$16x^2-10x$

9. $(x^2-3)(2x+1)$

$2x^3+x^2-6x-3$

10. $(x+1)(2x^2-5x-8)$

$2x^3-5x^2-8x+2x^2-5x-8$

$2x^3-3x^2-13x-8$

Divide using synthetic division. (remember 0's when you have missing factors)

11. $(12x^3-11x^2+7x+14)\div(x+3)$

-3 | 12 -11 7 14

↓ -36 141 -444

12 -47 148 -430

$12x^2-47x+148-\frac{430}{x+3}$

12. $(6x^5-33x^4+150x^2-96)\div(x-4)$

4 | 6 -33 0 150 0 -96

↓ 24 -36 -144 24 96

6 -9 -36 6 24 0

$6x^4-9x^3-36x^2+6x+24$

13. $(7x^3-4x^2+7x+18)\div(x+2)$

-2 | 7 -4 7 18

↓ -14 36 -86

7 -18 43 -68

$7x^2-18x+43-\frac{68}{x+2}$

14. $(2x^4-7x^3-15x-4)\div(x-4)$

4 | 2 -7 0 -15 -4

↓ 8 4 16 4

2 1 4 1 0

$2x^3+1x^2+4x+1$

Given f(x) = 3x - 2, g(x) = x^2 - 4 and h(x) = x + 5, find the following:

15. (f+g)(-2) = $-8+0=-8$

$f(-2)=3(-2)-2=-8$

$g(-2)=(-2)^2-4=0$

16. (f - g)(6) = $16-32=-16$

$f(6)=3(6)-2=16$

$g(6)=(6)^2-4=32$

17. (f·g)(1) = $1\cdot-3=-3$

$f(1)=3(1)-2=1$

$g(1)=1^2-4=-3$

18. (g/h)(0) = $\frac{-4}{5}$

$g(0)=(0)^2-4=-4$

$h(0)=0+5=5$

19. g(f(-1)) = 21

$f(-1)=3(-1)-2=-5$

$g(-5)=(-5)^2-4=21$

20. f(g(3)) = 13

$g(3)=(3)^2-4=5$

$f(5)=3(5)-2=13$

Algebra 2 Unit 2 Midterm Review Name_____

For 21-22 use $f(x) = x - 5$ and $g(x) = x^2 + 2$

21. Find $(f \circ g)(x)$

$f(g(x))$

$(x^2 + 2) - 5$

$\boxed{x^2 - 3}$

22. Find $(g \circ f)(x)$

$g(f(x))$

$(x - 5)^2 + 2$

$\boxed{(x-5)^2 + 2}$ =

Find the inverse of the following functions. $f^{-1}(x)$

23. $f(x) = 2x - 5$

$y = 2x - 5$

$x = 2y - 5$

$+5 \quad +5$

$\frac{x+5}{2} = \frac{2y}{2}$

$\boxed{f^{-1}(x) = \frac{x+5}{2}}$

24. $f(x) = \frac{1}{2}x + 3$

$y = \frac{1}{2}x + 3$

$x = \frac{1}{2}y + 3$

$-3 \quad -3$

$2 \cdot x - 3 = 2 \cdot \frac{1}{2}y$

$2(x-3) = y$

$f^{-1}(x) = 2(x-3)$ or $2x-$

25. $y = \sqrt{x+4}$

$x^2 = \sqrt{y+4}^2$

$x^2 = y + 4$

$-4 \quad -4$

$x^2 - 4 = y$

$\boxed{f^{-1}(x) = x^2 - 4}$

26. $y = \sqrt{x} - 3$

$x = \sqrt{y} - 3$

$+3 \quad +3$

$(x+3)^2 = \sqrt{y}^2$

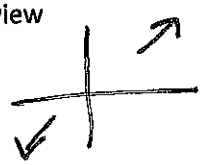
$\boxed{f^{-1}(x) = (x+3)^2}$

Informal Alg

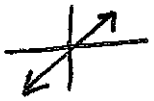
Unit 3 Final Review

odd −

odd +



Give (1) the **MAXIMUM** number of possible turns and (2) the left and (3) right behavior of each polynomial function.

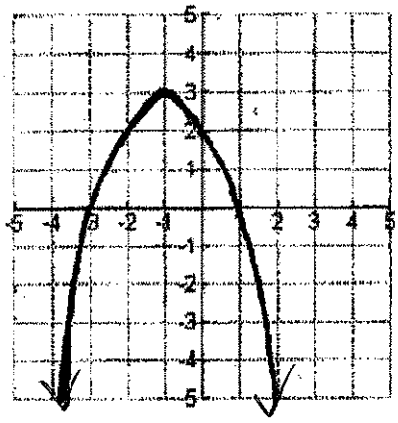


	1 $y=-2x^3+x-1$	2 $y=x^2+2x-1$	3 $y=2x+1$
# of turns	2	1	0
$x\to\infty$ right behavior:	$y\to-\infty$	$y\to+\infty$	$y\to+\infty$
$x\to-\infty$ left behavior:	$y\to+\infty$	$y\to+\infty$	$y\to-\infty$

	4 $y=2x^6-6x^4+4x^2-2$	5 $y=(x-5)^7-3$	6 $y=-2x^{12}+x-1$
# of turns:	5	6	11
$\to\infty$ right behavior:	$y\to+\infty$	$y\to+\infty$	$y\to-\infty$
$\to-\infty$ left behavior:	$y\to+\infty$	$y\to-\infty$	$y\to-\infty$

Use the graph to find a.) where the graph is increasing or decreasing, b.) the relative minimum and relative maximum, c.) the x- and y-intercept, d) whether the LC is positive or negative and the degree is even or odd.

7



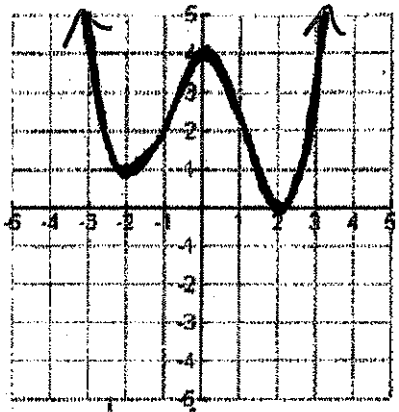
Min: none Max: $y=3$

(-3,0) x-int: $-3, 1$ y-int: (0,2)

(1,0)

LC: neg Degree: even

8.



local max $y=4$

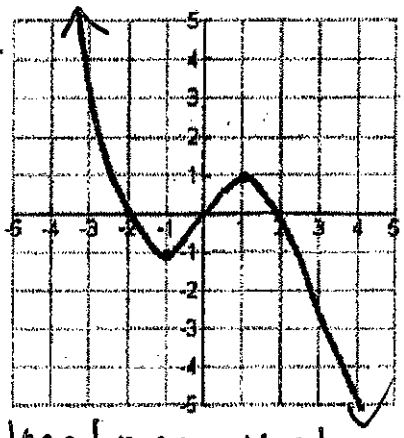
local min $y=1$

abs Min: $y=0$ abs Max: none

x-int: (2,0) y-int: (0,4)

LC: pos Degree: ~~odd~~ even

9.



local max $y=1$

local min $y=-1$

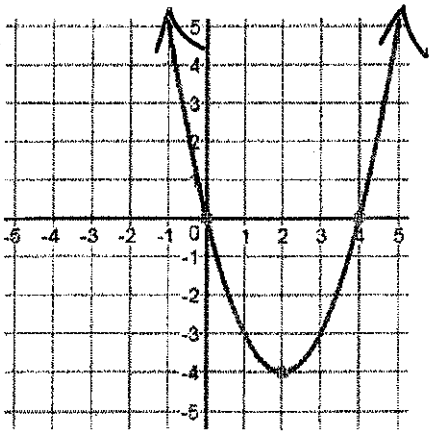
abs Min: none abs Max: none

x-int: (-2,0) (2,0) (0,0) y-int: (0,0)

LC: neg. Degree: odd

Find the domain and range of each graph. (write your answer in **inequality** notation)

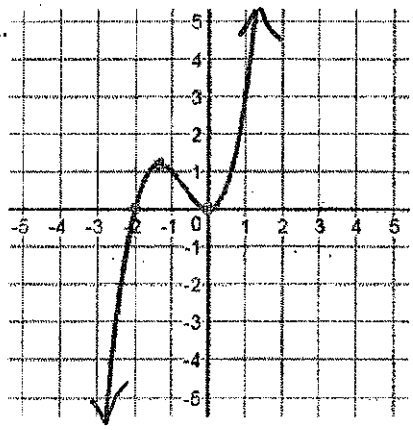
10.



Domain: all ℝ

Range: $y \geq -4$

11.



Domain: all ℝ

Range: all ℝ

Given the following function, use the remainder theorem to find the value.

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

a.) $f(-1)$

$$\begin{array}{r|rrrr} -1 & -2 & 4 & -6 & 1 \\ & \downarrow & 2 & -6 & 12 \\ \hline & -2 & 6 & -12 & (13) \end{array}$$

$f(-1) = 13$

b.) $f(0)$

$$\begin{array}{r|rrrr} 0 & -2 & 4 & -6 & 1 \\ & \downarrow & 0 & 0 & 0 \\ \hline & -2 & 4 & -6 & (1) \end{array}$$

$f(0) = 1$

c.) $f(2)$

$$\begin{array}{r|rrrr} 2 & -2 & 4 & -6 & 1 \\ & \downarrow & -4 & 0 & -12 \\ \hline & -2 & 0 & -6 & (-11) \end{array}$$

$f(2) = -11$

Determine whether the given x-value is a zero of the given function.

13. $x^4 - 8x^3 + 10x^2 + 2x + 4, \quad x = 2$

$$\begin{array}{r|rrrrr} 2 & 1 & -8 & 10 & 2 & 4 \\ & \downarrow & 2 & -12 & -4 & -4 \\ \hline & 1 & -6 & -2 & -2 & (0) \end{array}$$

Use because Remainder is 0.

14. $x^5 - 25x^3 - 7x^2 - 37x - 18, \quad x = -5$

$$\begin{array}{r|rrrrrr} -5 & 1 & 0 & -25 & -7 & -37 & -18 \\ & \downarrow & -5 & 25 & 0 & 35 & 10 \\ \hline & 1 & -5 & 0 & -7 & -2 & (-8) \end{array}$$

no because R = -8

Given the following function
a.) find the number and types of zeros
b.) find all zeros of the function (real and imaginary) given one real root

15. $f(x)=x^3-2x^2+16x-32$, x = 2

a) 3 zeros; 1 R, 2 imag

2 | 1 −2 16 −32
↓ 2 0 32
1 0 16 0

$x^2+16=0$

$\sqrt{x^2}=\sqrt{-16}$

$x=\pm 4i$

b) $x=2,\ x^2=-16$
$x=\pm 4i$

16. $f(x)=x^3-x^2-18x+8$, x = -4

a) 3 zeros; 3 R

−4 | 1 −1 −18 8
↓ −4 20 −8
1 −5 +2 0

$x^2-5x+2=0$

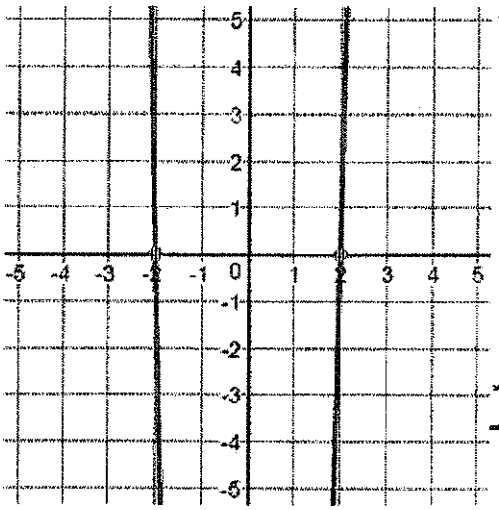
use Q.F.

$\frac{-(-5)\pm\sqrt{(-5)^2-4(1)(2)}}{2(1)}=$

b) $\frac{5\pm\sqrt{17}}{2}$ and

Given the following function
a.) find the number and types of zeros
b.) find all zeros of the function (real and imaginary) given the graph

17. $f(x)=x^4+3x^2-28$



a) 4 zeros; 2 R, 2 imag.

$x=\pm 2$

2 | 1 0 3 0 −28
↓ 2 4 14 28
1 2 7 14 0

−2 | ↓ −2 0 −14
1 0 7 0

$x^2+7=0$

$x^2=-7$

$x=\pm i\sqrt{7}$

b) Zeros

$x=+2,-2$

$+i\sqrt{7},-i\sqrt{7}$