

Name: Answers

Date: _____

Algebra II

Unit 3 & 4 Review Questions

1. Factor each of the following:

a) $2x^2 - 2x - 12$

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

b) $x^3 - 4x$

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

c) $x^3 + 2x^2 + 2x + 4$

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

2. Solve for x by factoring: $4x^2 - 20x - 5 = -2x^2 + 9x$

$$\begin{aligned} &+2x^2 - 9x \qquad -30 \rightarrow -30, +1 \\ &6x^2 - 29x - 5 = 0 \\ &6x^2 - 30x + 1x - 5 = 0 \end{aligned}$$

$$\begin{aligned} &6x(x-5) + 1(x-5) = 0 \\ &(6x+1)(x-5) = 0 \\ &\frac{6x+1=0}{x=-\frac{1}{6}} \quad \frac{x-5=0}{x=5} \end{aligned}$$

3. Solve for x using completing the square and express the roots in simplest $a+bi$ form:

$3x^2 - 12x = -21$

$$\frac{3x^2}{3} - \frac{12x}{3} = \frac{-21}{3}$$

$$\begin{aligned} &x^2 - 4x = -7 \\ &\sqrt{(x-2)^2} = \sqrt{-3} \\ &x-2 = \pm\sqrt{-3} \end{aligned}$$

$$\begin{aligned} &x-2 = \pm i\sqrt{3} \\ &+2 \quad +2 \\ &\boxed{x = 2 \pm i\sqrt{3}} \end{aligned}$$

4. Solve for x by using the quadratic formula and express the roots in simplest $a+bi$ form:

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

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

$a=3$
 $b=-6$
 $c=4$

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4(3)(4)}}{2(3)}$$

$$x = \frac{6 \pm \sqrt{-12}}{6} \Rightarrow x = \frac{6 \pm 2i\sqrt{3}}{6} = \frac{6}{6} \pm \frac{2i\sqrt{3}}{6}$$

5. Perform the indicated operations and express your answer in simplest $a+bi$ form.

a) $(6 + \sqrt{-49}) + (3 + \sqrt{-64})$

$(6 + 7i) + (3 + 8i)$ *USE CALC!

$$\boxed{9 + 15i}$$

b) $(-1 + 2\sqrt{-12}) - (8 + 5\sqrt{-48})$

$(-1 + 2(2i\sqrt{3})) - (8 + 5(4i\sqrt{3}))$

$(-1 + 4i\sqrt{3}) + (-8 - 20i\sqrt{3})$

$$\boxed{-9 - 16i\sqrt{3}}$$

6. Perform the following complex calculation. Express your answer in simplest $a+bi$ form.

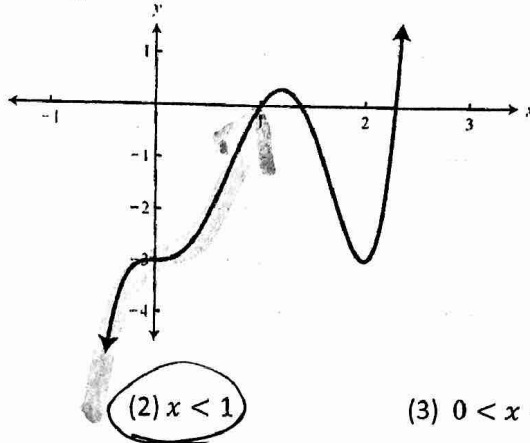
$$\begin{aligned} &7(3x-5i) + (4x-2i)(-6x+7i) \qquad i^2 = -1 \\ &21x - 35i + [-24x^2 + 28xi + 12xi - 14i^2] \end{aligned}$$

$$21x - 35i + (-24x^2 + 40xi + 14) = \boxed{-24x^2 + 40xi + 21x - 35i + 14}$$

*TERMS CAN BE IN ANY ORDER

Unit 4 Sample Questions

2 1. For the polynomial function graphed below, which of the following intervals given is the function strictly increasing?



(1) $x > 0$
1

(2) $x < 1$

(3) $0 < x < 2$

(4) $x >$

3 2. What is the value of k such that $(2x^3 - kx^2 + x - 6) \div (x - 2)$ has a remainder of zero?

(1) -2

(2) 2

(3) 3

(4) -6

Plug in
 $x = 2$

$$2(2)^3 - k(2)^2 + (2) - 6 = 0$$

$$16 - 4k - 4 = 0$$

$$12 - 4k = 0$$

$$\frac{12}{4} = \frac{4k}{4} \quad k = 3$$

2 3. The function $f(x)$ is an odd function with $f(3) = 7$ and $f(9) = 11$. Then $f(-3)$ must be equal to

(1) 7

(3) 3

(2) -7

(4) -11

MUST = -7
≡ (NEGATIVE of $f(3)$)

3 4. Which of the following is a factor of the cubic expression $x^3 - 3x^2 - 64x - 60$?

(1) $(x - 5)$

(3) $(x + 1)$

(2) $(x + 10)$

(4) $(x - 12)$

Graph this in Y_1 and find an x -int.

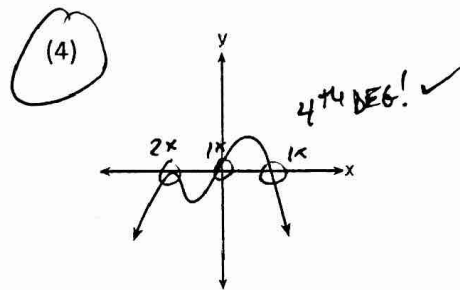
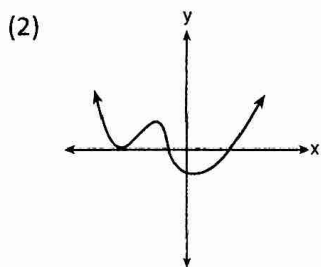
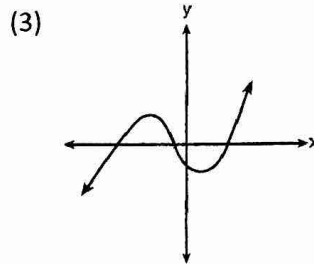
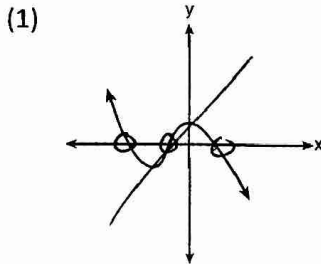
$$x \text{ int's at } x = -6 \Rightarrow (x + 6)$$

$$x = -1 \Rightarrow (x + 1)$$

$$x = 10 \Rightarrow (x - 10)$$

4 5. Which graph has the following characteristics?

- 4th degree
- As $x \rightarrow -\infty, f(x) \rightarrow -\infty$ DOWN TO LEFT
- As $x \rightarrow \infty, f(x) \rightarrow \infty$ ~~DOWN TO RIGHT~~
DOWN TO RIGHT



6. Divide: $(2x^2 + 2x + 5) \div (x + 2)$ → use SYNTH-DIV:

$$\begin{array}{r} -2 \overline{) 2 \ 2 \ 5} \\ \underline{-4 \quad 4} \\ 2 \ -2 \ 9 \\ \underline{-2 \quad 12} \\ 0 \end{array}$$

(1) $2x - 2 + \frac{9}{x+2}$

3) $2x + 7$

2) $2x + 6 + \frac{17}{x+2}$

4) $-4x + 10 - \frac{15}{x+2}$

7. Algebraically determine whether the function $p(x) = x^4 + 3x^2 - 12$ is even, odd, or neither.

$$p(-x) = (-x)^4 + 3(-x)^2 - 12$$

$$p(-x) = x^4 + 3x^2 - 12$$

SAME

SO EVEN FUNCTION

$$f(-x) = f(x)$$

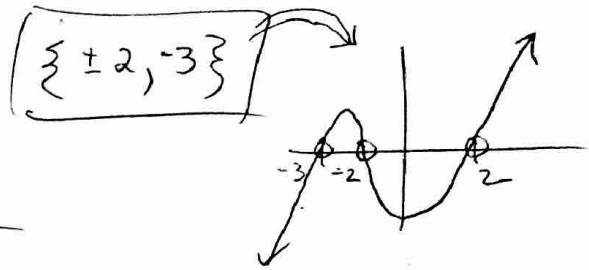
8. Find the third term in the expansion of $(x - 2y)^4$

$$1 \binom{4}{0} (x)^4 (-2y)^0 + 4 \binom{4}{1} (x)^3 (-2y)^1 + 6 \binom{4}{2} (x)^2 (-2y)^2 + 4 \binom{4}{3} (x)^1 (-2y)^3 + 1 \binom{4}{4} (x)^0 (-2y)^4$$

$\downarrow \quad \downarrow \quad \downarrow$
 $6 \quad (x^2) \quad (4y^2)$
 $\boxed{+24x^2y^2}$

9. Given: $p(x) = x^3 + 3x^2 - 4x - 12$, find all values of x that satisfy the equation $p(x) = 0$. (Only an algebraic solution will be acceptable.)

$$\begin{aligned}
 x^3 + 3x^2 - 4x - 12 &= 0 \\
 x^2(x+3) - 4(x+3) &= 0 \\
 (x^2 - 4)(x+3) &= 0 \\
 (x+2)(x-2)(x+3) &= 0 \\
 \hline
 x = -2 \quad | \quad x = 2 \quad | \quad x = -3
 \end{aligned}$$

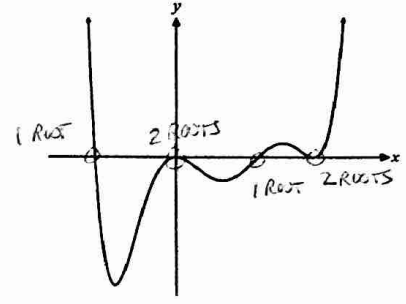


10. The graph of a polynomial is shown below.

What is the degree of this polynomial function? 6th DEGREE

As $x \rightarrow \infty$, then $f(x) \rightarrow +\infty$.
 MOVE RIGHT, GRAPH GOES UP

As $x \rightarrow -\infty$, then $f(x) \rightarrow +\infty$.
 MOVE LEFT, GRAPH GOES UP



Is this function even, odd, or neither? Why? NEITHER

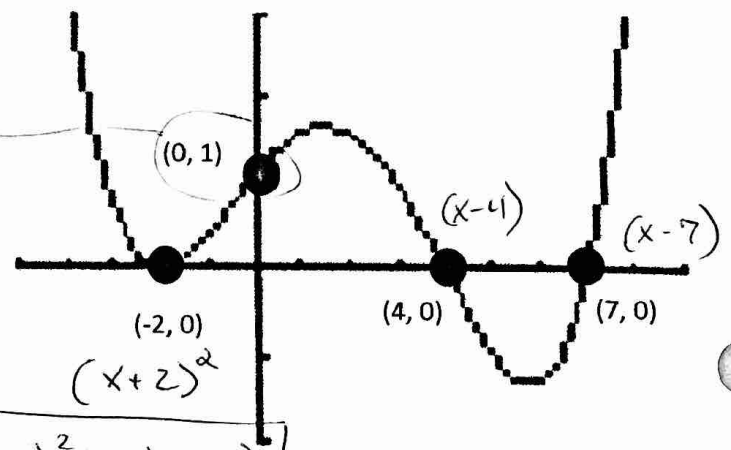
DOES NOT HAVE Y-AXIS SYMMETRY (EVEN)

DOES NOT HAVE PT. SYMM THRU THE ORIGIN (ODD)

11. Find an equation of the following polynomial function.

$$\begin{aligned}
 y &= a(x+2)^2(x-4)(x-7) \\
 1 &= a(0+2)^2(0-4)(0-7) \\
 1 &= a(4)(-4)(-7) \\
 1 &= 112a \\
 \frac{1}{112} &= \frac{112a}{112} \quad a = \frac{1}{112}
 \end{aligned}$$

use this for x, y to solve for "a"



$$\boxed{y = \frac{1}{112}(x+2)^2(x-4)(x-7)}$$