Algebra II
Unit 8 Review

Name Answer Key

1. Divide. You may use long **or** synthetic division.

a) $\dfrac{2x^3+3x-5}{x+2}$

x^3 x^2 x 0

-2 | 2 0 3 -5

$\downarrow$ -4 8 -22

2 -4 11 -27

$2x^2-4x+11-\dfrac{27}{x+2}$

b) $\dfrac{10x^2+x-3}{5x+3}$

$2x-1$

$5x+3 \;|\; 10x^2+x-3$

$+(-10x^2+6x)$

$-5x-3$

$+(+5x+3)$

0

$2x-1$

c) $\dfrac{3x^4+x^3-2x+7}{x^2-x+1}$

$3x^2+4x+1-\dfrac{5x+6}{x^2-x+1}$

$x^2-x+1 \;|\; 3x^4+x^3+0x^2-2x+7$

$+(-3x^4+3x^3-3x^2)$ $\downarrow$

$4x^3-3x^2-2x$

$+(-4x^3+4x^2-4x)$ $\downarrow$

x^2-6x+7

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

$-5x+6$

$3x^2+4x+1-\dfrac{5x+6}{x^2-x+1}$

2. **Use synthetic substitution** to find P(c) for the given polynomial P(x) and the given number c.

$P(x) = x^3 + 2x^2 - 6x - 4$; $c = -2$

-2 | 1 2 -6 -4

$\downarrow$ -2 0 12

1 0 -6 8

$P(-2) = 8$

3. Use the factor theorem to determine whether $x + 1$ is a factor of P(x). Show your work to receive full credit, and circle the answer.

$P(x) = x^{12} - 3x^8 - 4x - 2$ Circle one: (Factor) or Not a Factor

12 11 10 9 8 7 6 5 4 3 2 1 0

-1 | 1 0 0 0 -3 0 0 0 0 0 -4 -2

$\downarrow$ -1 1 -1 1 2 -2 2 -2 2 -2 2 2

1 -1 1 -1 -2 2 -2 2 -2 2 -2 -2 0

4. Consider the polynomial $2x^3 - 5x^2 - 4x + 3$. (a = 2, b = 3)

a) State the number of possible factors.

3

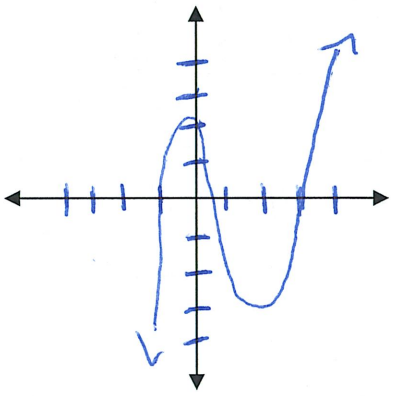
b) State all of the possible roots by using the rational root theorem.

$b \in \pm\{1, 3\}$

$a \in \pm\{1, 2\}$

$\frac{b}{a} \in \pm\{1, \frac{1}{2}, 3, \frac{3}{2}\}$

c) Draw a graph of the polynomial.



$X = -1, 3$

d) By using the calculator and/or synthetic division, write the polynomial in factored form.

	x^3	x^2	x	0
x^3 -1	2	-5	-4	3
	↓	-2	7	-3
x^2 3	2	-7	3	0
	↓	6	-3	
x	2	-1	0	

$2x - 1$

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

5. Write a third-degree equation which has solutions of x = -3i, and x = 5.

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

$(x^2 + 3xi - 3xi - 9i^2)(x-5) = 0$

$(x^2 + 9)(x-5) = 0$

$x^3 - 5x^2 + 9x - 45 = 0$

6. Answer each question.

a) What is true about the tails of an even degree function?

Same direction

b) What is the maximum number of "bumps" in a 6th degree polynomial?

$n=6$ $6-1$ 5 bumps

c) Can an even degree polynomial have no x-intercepts?

yes

d) Can an odd degree polynomial have no x-intercepts?

NO

e) Can a polynomial with real coefficients have only one imaginary root?

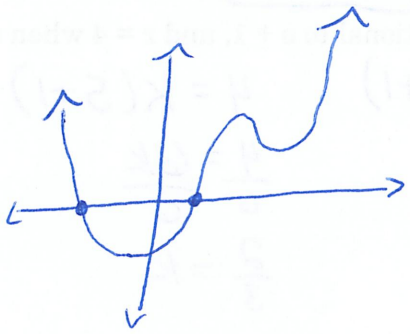
No

7. Draw a graph for a fourth-degree polynomial equation that has two real roots.

2 real roots = 2 - x-int

max bumps = 3

tails: same



8. Given the following entries from a table for a function L, use linear interpolation to estimate x to three significant digits if L(x) = 0.525.

x	1.5	1.6	1.7	1.8
L(x)	0.405	0.470	0.531	0.588

$$.1\left[d\begin{bmatrix}1.6 & 0.470\\ x & 0.525\\ 1.7 & 0.531\end{bmatrix}.055\right].061$$

$\frac{d}{.1} = \frac{.055}{.061}$

$\frac{.061d}{.061} = \frac{0.0055}{.061}$

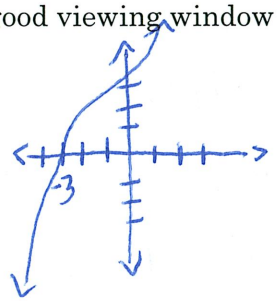
$d = .0902$

$x = 1.600 + .0902$

$x = 1.6902$

9. Consider the function $y = x^3 + 3x^2 + 16x + 48$

a) Draw a graph of the function. (A good viewing window is x-min = -10, x-max = 10, y-min = -60, and y-max = 60.)



$x = -3$

b) Find the values of the **real** zeros of the function.

$x = -3$

$$\begin{array}{r|cccc} -3 & 1 & 3 & 16 & 48 \\ & \downarrow & -3 & 0 & -48 \\ \hline & 1 & 0 & 16 & 0 \end{array}$$

c) Find the values of the **imaginary** zeros of the function.

$x^2 + 16 = 0$

$-16 \quad -16$

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

$\boxed{x = \pm 4i}$

10. If r is **directly** proportional to s + 1, and r = 4 when s = 5, find r when s = 8.

$r = k(s+1)$ $\quad 4 = k(5+1)$ $\quad r = \frac{2}{3}(8+1)$

$\frac{4}{6} = \frac{6k}{6}$ $\quad r = \frac{2}{3}\left(\frac{9}{1}\right)^3$

$\frac{2}{3} = k$ $\quad \boxed{r = 6}$

11. The distance an object falls from rest is directly proportional to the square of the length of time it has fallen. If an object falls 64 feet in 2 seconds, how far will it fall in 3 seconds?

d = distance
t = time

$d = kt^2$ $\quad \frac{64}{4} = \frac{k2^2}{4}$ $\quad d = 16(3^2)$

$16 = k$ $\quad d = 16 \cdot 9$

$\boxed{d = 144 \text{ ft}}$

12. If y varies **inversely** with x, and y = 5 when x = 4, find x when y = 10.

$y = \frac{k}{x}$ $\quad 4(5) = \left(\frac{k}{4}\right)4$ $\quad \frac{10}{1} = \frac{20}{x}$

$20 = k$ $\quad \frac{10x}{10} = \frac{20}{10}$

$\boxed{x = 2}$