Name: Key Date: _____

Pre-Calculus

1st Semester Exam Review 3

Chapter 1

1. Let A = (-4, 7) and B = (4,-5).

a. Find the length of $\overline{AB}$ $D = \sqrt{(-4-4)^2+(7-(-5))^2} = \sqrt{64+144} = \sqrt{208}$

Length = $4\sqrt{13}$ units

b. Find the coordinates of the midpoint of $\overline{AB}$. $\left(\frac{-4+4}{2}, \frac{7+(-5)}{2}\right)$

Midpoint: (0, 1)

2. Find the value of a if it is known that the point (-3,7) lies on the line $2x + ay = 26$.

$a = 32/7$ $2(-3)+a(7)=26$ $-6+7a=26$ $7a=32$

3. Solve the equations $3x - 2y = 3$ and $5x + 4y = 16$ simultaneously.

(2, 3/2) $3(2)-2y=3$ $6-2y=3$ $-2y=-3$ $y=3/2$

$2(3x-2y=3)$ $6x-4y=6$ $5x+4y=16$ $11x=22$ $x=2$

4. Find the slope and y-intercept of the line $3x + 2y = -1$.

Slope: $-3/2$ y-intercept: $-1/2$ $y = \frac{-3}{2}x - \frac{1}{2}$

6. Write an equation of the line through the points (6,-2) and (3,7).

$y = -3x+16$ $m = \frac{7-(-2)}{3-6} = \frac{9}{-3} = -3$ $7 = -3(3)+b$ $7 = -9+b$ $16 = b$

7. Write an equation of the line through the point (2,5) and parallel to the line $4x - 3y = -50$.

$y = \frac{4}{3}x + \frac{7}{3}$ $y = \frac{4}{3}x + \frac{50}{3}$ $5 = \frac{4}{3}(2)+b$ $5 = \frac{8}{3}+b$ $\frac{7}{3} = b$

12. $\sqrt{-12} - \sqrt{-48}$

$2i\sqrt{3} - 4i\sqrt{3}$

$-2i\sqrt{3}$

13. $(3 - 2i)^2$ (-1) $9-6i-6i+4i^2$

$5-12i$

14. $\frac{1}{4-7i}\frac{(4+7i)}{(4+7i)} = \frac{4+7i}{65}$ or $\frac{4}{65} + \frac{7i}{65}$

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15. $\frac{\sqrt{3}+2i}{\sqrt{3}-2i} \cdot \frac{(\sqrt{3}+2i)}{(\sqrt{3}+2i)} = \frac{-1+4i\sqrt{3}}{7}$ $\quad \frac{3+4i\sqrt{3}+4i^2}{3-4i^2}$

16. $4(3+4i)-5i(1+i)$ $\quad 12+16i-5i-5i^2$

$17+11i$

18a. solve for x. $12x^2 + 12 = 25x$ $\quad 12x^2-25x+12=0$

$x = \frac{25 \pm \sqrt{625-576}}{24}$

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

Chapter 2

$x = \frac{32}{24}, \frac{18}{24}$

1. If $P(x) = 4x^3-5x^2+1$, use synthetic substitution to find:

a. $P(2)$

2	4	-5	0	1
		8	6	12
	4	3	6	13

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b. $P(\frac{1}{2})$

$\frac{1}{2}$	4	-5	0	1
		2	$-\frac{3}{2}$	$-\frac{3}{4}$
	4	-3	$-\frac{3}{2}$	$\frac{1}{4}$

$\frac{1}{4}$

c. $P(i)$

i	4	-5	0	1
		4i	-5i+4	-4i+5
	4	-5+4i	-4-5i	6-4i

6-4i

2. If -2 is a zero of the polynomial $P(x) = 2x^2 + x + k$, find the value of k.

$k = -6$

3. A polynomial P(x) is divided by x-2. The quotient is $2x^2 + x - 2$ and the remainder is -1. Find P(x).

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

4. Two roots of the equation $x^4+x^3-5x^2+x-6 = 0$ are $x = 2$ and $x = -3$. Find the remaining roots.

$x = \pm i$

6. Write a cubic equation with roots of $x = -3$, $x = -1$, and $x = 1$ and with the point (0,1).

$y = \frac{-1}{3}(x+3)(x+1)(x-1)$ or $y = \frac{-1}{3}x^3-x^2+\frac{1}{3}x+1$

9. Solve $2x^3 + 2x^2 = 4x + 4$

$x = -1, \pm\sqrt{2}$

10. Find all real and imaginary roots of $2x^4+3x^3+7x^2-7x-5 = 0$.

$x = \frac{-1}{2}, 1, -1 \pm 2i$

11. Find the sum and product of the roots of $3x^3-2x^2+x-6 = 0$.

sum: $\frac{2}{3}$ product: 2

12. Find a cubic equation with integral coefficients having 1 + i and 3 has roots.

$y = x^3 - 5x^2 + 8x - 6$

Chapter 3

Solve inequality or equation.

1a. $-2(4x - 3) < 12 - 6x$

$x > -3$

1b. $\frac{2}{3}(2x + 1) \leq \frac{2x-6}{5}$

$x \leq -2$

2a. $|x + 4| < 3$

$-7 < x < -1$

2b. $|x - 2| > 5$

$x < -3$ or $x > 7$

2c. $|2x - 5| = 5$

$x = 0$ or $x = 5$

3a. $(x - 2)(x + 3)^3(2x - 1)^2 \geq 0$

$x \leq 3$ or $x = \frac{1}{2}$ or $x \geq 2$

3b. $3x^2 - 5x + 5 < 0$

No Solution

3c. $2x^3 - x \leq -x^2$

$x \leq -1$ or $0 \leq x \leq \frac{1}{2}$

3d. $\frac{(2x+1)(x-5)}{(x-3)^3} \leq 0$

$x \leq \frac{-1}{2}$ or $3 \leq x \leq 5$

4. Describe the set of points in the coordinate plane that satisfies the inequality $2x + 3y \geq 12$.

All points that are on or above the line $2x + 3y = 12$

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Chapter 4

1. Give the domain, range, and zeros of the function $f(x) = \sqrt{x^2 - 16}$

Domain: $X \leq -4$ or $X \geq 4$ Range: $f(x) \geq 0$ Zeros: $X = \pm 4$

3. Let $f(x) = x^2 - 3x + 2$ and $g(x) = x - 2$. Find:

a.(f+g)(x) b. (f-g)(x) c. (f·g)(x) d.$(\frac{f}{g})(x)$ $X-1, X \neq 2$

X^2+2X X^2-4X+4 X^3-5X^2+8X-4

4. Using the function f and g from problem 3, find:

a. f(g(x)) b. g(f(x))

$X^2-7X+12$ X^2-3X

6. Determine whether the graph of x^2-xy +y^2 = 6 has symmetry in (i) x-axis, (ii) y-axis, (iii) the line y = x, and (iv) the origin.

(iii) line $y=x$ (iv) origin

7. Describe the transformation.

a. $y = \frac{1}{2}f(x)$ c. $y = -f(x)$ d. $y = f(x-2)$

vertical compression by ½ reflected over x-axis translated right 2 units

9a. Which one of the two functions $f(x) = \sqrt{9 - x^2}$ and $g(x) = 2x - 3$ has an inverse? Find the rule for the inverse. $g(x)$

$g^{-1}(x) = \frac{x+3}{2}$

10. The length c of the hypotenuse of a right triangle is a function of the lengths a and b the legs.

a. state a rule for the function c(a,b).

$c(a,b) = \sqrt{a^2+b^2}$

b. Find c(3,4) and c(12,5).

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