Math 1470 – Fall 2012 Names: Todd's guesses

Ch 1-3 Review

For full credit **show all your work**. Put the writer's name in the margin next to the problem.

$2x^3 + 0x^2 + 3x + 2$

1) Divide $(3x + 2 + 2x^3) \div (x - 1)$ using algebraic long division.

$$x-1 \,\overline{)\, 2x^3 + 0x^2 + 3x + 2}$$ quotient $2x^2 + 2x + 5$

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

$2x^2 + 3x$

$- 2x^2 - 2x$

$5x + 2$

7

$2x^2 + 2x + 5$, $r = 7$

$3x^4 + 0x^3 - 5x^2 + 0x + 3$

2) Divide $(3x^4 - 5x^2 + 3) \div (x + 2)$ using synthetic division.

−2	3	0	−5	0	3
		−6	12	−14	28
	3	−6	7	−14	31

$3x^3 - 6x^2 + 7x - 14$ $r = 31$

3) Find, and simplify, a polynomial that has zeros of 3, 2, and 0.

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

$= (x^2 - 5x + 6)x$

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

4) Find all roots exactly for the polynomial $P(x) = x^4 + 2x^3 - 2x^2 - 6x = 3$.

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

± 1 $\pm 1, \pm 3$

Try -1

−1	1	2	−2	−6	−3
		−1	−1	3	3
	1	1	−3	−3	0

Try -1

−1	1	1	−3	−3
		−1	0	3
	1	0	−3	0

$x^2 - 3 = 0$

$x = \pm\sqrt{3}$

$\therefore$ Roots are $\{-1, -1, -\sqrt{3}, \sqrt{3}\}$

Let $f(x) = \dfrac{1}{x+2}$ and $g(x) = x^2 + 4x + 4$

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

$= f(x^2 + 4x + 4)$

$= \dfrac{1}{(x^2+4x+4)+2}$

$= \dfrac{1}{x^2 + 4x + 6}$

6) Find $f(x) \cdot g(x)$.

$(x+2)(x+2)$

$= \left(\dfrac{1}{\cancel{x+2}}\right)(x^2 + 4x + 4)$

$= x + 2$

7) Find $\dfrac{g(x) - g(x+h)}{h}$

$= \dfrac{x^2 + 4x + 4 - [(x+h)^2 + 4(x+h) + 4]}{h}$

$= \dfrac{\cancel{x^2} + \cancel{4x} + \cancel{4} - [\cancel{x^2} + 2hx + h^2 + \cancel{4x} + 4h + \cancel{4}]}{h}$

$= \dfrac{2hx + h^2 + 4h}{h}$

$= \dfrac{\cancel{h}(2x + h + 4)}{\cancel{h}} = 2x + h + 4$

8) Find a line perpendicular to $y = 4x + 3$ and passing through the point (4, -7). Graph both and provide an equation for the new line in slope intercept form.

$m = -1/4$

$y = -1/4\, x + b$

$-7 = -1/4\,(4) + b$

$-7 = -1 + b$

$-6 = b$

$y = -1/4\, x + -6$

Solve the following equations:

9) $\frac{3a-1}{a^2+4a+4}-\frac{3}{a^2+2a}=\frac{3}{a}$

$$\Rightarrow \frac{3a^2-a-3a-6}{a(a+2)^2}=\frac{3a^2+12a+12}{a(a+2)^2}$$

$$\Rightarrow \cancel{3a^2}-4a-6=\cancel{3a^2}+12a+12$$

$$-18=16a$$

$$-9/8=a$$

10) Solve and, if possible, write your answer using both inequality notation and interval notation. $\sqrt{x^2}<3$

$$|x|<3$$

$$-3<x<3$$

$$(-3,3)$$

11) $\frac{2x^2+7x+3}{2x^2-7x-4}=1$

$$\cancel{2x^2}+7x+3=\cancel{2x^2}-7x-4$$

$$14x=-7$$

$$x=-1/2$$

12) $\frac{t}{t+3}+\frac{4t}{t-3}-\frac{18}{t^2-9}=1$

$$\frac{t^2-3t+4t^2+12t-18}{(t^2-9)}=1$$

$$5t^2+9t-18=t^2-9$$

$$4t^2+9t-9=0$$

$$(4t-3)(t+3)=0$$

$$t=3/4 \quad \cancel{t=-3}$$

13) Find the center and radius of the circle given by: $x^2+y^2-4x-6y=51$

$$x^2-4x+\quad y^2-6y+\quad=51$$

$$(x^2-4x+4)-4+(y^2-6y+9)-9=51$$

$$(x-2)^2+(y-3)^2-13=51$$

$$(x-2)^2+(y-3)^2=64$$

Center: $(2,3)$
Radius $=8$

14) $\frac{6}{y+4}+1=\frac{5}{2y+8}$

$$\frac{12}{2y+8}+\frac{2y+8}{2y+8}=\frac{5}{2y+8}$$

$$12+2y+8=5$$

$$2(y+10)=5$$

$$y+10=5/2$$

$$y=-15/2$$

15) $\frac{1}{b-5}-\frac{10}{b^2-25}=\frac{1}{b+5}$

$$\frac{b+5-10}{b^2-25}=\frac{b-5}{b^2-25}$$

$$b-5=b-5$$

$$b=b$$

True for all values of b.

16) $\frac{x-\frac{1}{x}}{1+\frac{1}{x}}=3$

$$\Rightarrow \frac{x^2-1}{x+1}=3$$

$$\Rightarrow x-1=3$$

$$x=4$$

17) Jeopardy – I'll give you the answer and you come up with a question:

$-\frac{9}{8} \Rightarrow \frac{3a-1}{a^2+4a+4}-\frac{3}{a^2+2a}=\frac{3}{a}$!!

(See #9)