Math 1105 Re-Design Final exam review

1.) Multiply + reduce $\dfrac{3x+9}{4x-12} \cdot \dfrac{x^2-x-6}{x^2-9}$

$\dfrac{3(x+3)}{4(x-3)} \cdot \dfrac{(x-3)(x+2)}{(x+3)(x-3)} = \dfrac{3(x+2)}{4(x-3)}$

2.) Multiply $(2-3i)(4+5i)$ and put in $a+bi$ form

FOIL: $8+10i-12i-15i^2 = 8-2i-15(-1) = 8-2i+15 = 23-2i$

3.) Solve the equation $3x^2-13x-10=0$

factor $(3x+2)(x-5)=0$ or Quad formula $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x=-\dfrac{2}{3}$ $x=5$

$x = \dfrac{13 \pm \sqrt{169+120}}{6} = \dfrac{13 \pm \sqrt{289}}{6} = \dfrac{13 \pm 17}{6}$

$= \dfrac{13+17}{6} = \dfrac{30}{6} = 5$ $\dfrac{13-17}{6} = \dfrac{-4}{6} = -\dfrac{2}{3}$

4.) Solve $\sqrt{2x+8}=4$

$(\sqrt{2x+8})^2 = 4^2$

$2x+8=16$ $2x=8$ $x=4$

5.) Solve $2y-13\sqrt{y}+20=0$

let $y=u^2$ $2u^2-13u+20=0$ $u=5/2$ $u=4$

$\sqrt{y}=u$ factor or use Quad formula $\sqrt{y}=5/2$ $\sqrt{y}=4$

$y=(5/2)^2$ $y=4^2$

$=\dfrac{25}{4}$ $y=16$

6.) Solve inequality $x^2+2x-8 \le 0$

$(x+4)(x-2) \le 0$ $(-\infty,-4]$ $[-4,2]$ $[2,\infty)$

$x=-4, x=2$

let $x=-5$ -4 $x=0$ 2 $x=3$

$(-1)(-7) \le 0$ $(4)(-2)$ $(7)(1) \le 0$

$7 \le 0$ NO $-8 \le 0$ yes $7 \le 0$ NO

7.) Solve $|3x-6|=9$

$3x-6=9$ $3x=15$ $x=5$

$-9=3x-6$ $-3=3x$ $x=-1$

8.) Solve $|3x-7| \geq 5$

$-5 \geq 3x-7 \geq 5$ $2 \geq 3x \geq 12$ $\boxed{\frac{2}{3} \geq \boxed{x} \geq 4}$

$x < \frac{2}{3} \cup x > 4$ $(-\infty, \frac{2}{3}) \cup (4, \infty)$

9.) Find distance between $(-2, 4)$ and $(6, -2)$

$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2} = \sqrt{(6+2)^2 + (-2-4)^2} = \sqrt{8^2 + (-6)^2} = \sqrt{64+36}$
$= \sqrt{100} = 10$

10.) Find midpoint $(5, -2)$ and $(-1, 4)$

midpt $\left(\frac{5-1}{2}, \frac{-2+4}{2}\right) = \left(\frac{4}{2}, \frac{2}{2}\right) = (2, 1)$

11) Tell if a function is even or odd

$y = x^2 + 4$ even $y = x^3 + x$ odd

12) Find equation of circle with center at $(-2, 4)$, radius $= 3$

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

13) If $f(x) = \frac{3x}{\sqrt{9-x^2}}$ find $f(3)$ $f(3) = \frac{3(3)}{\sqrt{9-3^2}} = \frac{9}{\sqrt{9-9}}$
$= \frac{9}{\sqrt{0}} = \frac{9}{0} = $ undefined

14.) If $f(x) = x^2$, what would new equation be if horizontal shift 3 right, vertical shift down 1, reflect x-axis $f(x) = -(x-3)^2 - 1$

15) For $f(x) = x^2 + 2x - 1$ and $g(x) = 2x-3$ find $f \circ g$

$f \circ g = (2x-3)^2 + 2(2x-3) - 1$
$= 4x^2 - 12x + 9 + 4x - 6 - 1 = 4x^2 - 8x + 2$

16.) Find the inverse $f(x) = \sqrt{x+2}$

$y = \sqrt{x+2}$ → $x^2 = y+2$ $f^{-1} = x^2 - x$

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

17.) Find vertex for $y = 4x^2 + 8x + 10$

$h = -\dfrac{b}{2a} = -\dfrac{8}{2(4)} = -\dfrac{8}{8} = -1$ $k = f(-1) = -4(-1)^2 + 8(-1) + 10$

$= -4(1) - 8 + 10 = -2$ $V(-1, -2)$

18) Find maximum value for $y = \cancel{4x^2} \; 8 - 4x - x^2$

K is max value $h = -\dfrac{-4}{2(-1)} = -2$ $k = f(-2) = 8 - 4(-2) - (-2)^2$
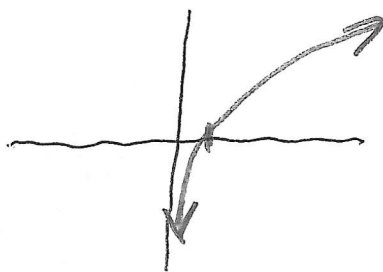
$= 8 + 8 - 4 = 12$

19) $\log_3 81 =$ $a^y = x$ $3^y = 81$ $y = 4$

20) Solve for x $3^{x+2} = 27$

$3^{(x+2)} = 3^3$ $x + 2 = 3$ $x = 1$

21) Find amount you would have investing $\$7,000$ at rate of 4.25% compounded quarterly for 5 years. $A = P\left(1 + \dfrac{r}{n}\right)^{nt}$

$A = 7000\left(1 + \dfrac{.0425}{4}\right)^{4(5)} = 8647.66$

22) Write $\log_3 81 = 4$ in exponential log form

$a = 3$ $x = 81$ $y = 4$ $a^y = x$ $3^4 = 81$

23) Graph of $f(x) = \log_2 x$

24.) Write in condensed form

$2\log x + 4\log y - \frac{1}{2}\log z$ $\log x^2 + \log y^4 - \log z^{1/2}$

$\log\left(\dfrac{x^2 y^4}{\sqrt{z}}\right)$

25) Calculate $\log_5 121$ to 2 decimal places

$$\log_5 121 = \frac{\log 121}{\log 5} \text{ or } \frac{\ln 121}{\ln 5} = 5.42$$

26) Solve for x $\quad 5^x = 71$ to 2 decimal places

$$\log 5^x = \log 71 \qquad x \log 5 = \log 71 \qquad x = \frac{\log 71}{\log 5} = 2.65$$

27.) Solve for x $\quad \log(4x-2) - \log(3x+1) = 0$

$$\log\left(\frac{4x-2}{3x+1}\right) = 0 \qquad a^y = x \qquad 10^0 = \frac{4x-2}{3x+1} \qquad 1 = \frac{4x-2}{3x+1}$$

$$a = 10 \quad x \quad y$$

$$3x+1 = 4x-2 \qquad 3 = x$$

8) Solve the system $\qquad \begin{cases} x-2y = 6 \\ x-5y = 9 \end{cases}$

$$\begin{array}{r} x-2y = 6 \\ -x+5y = -9 \\ \hline 3y = -3 \\ y = -1 \end{array}$$

$$x - 2(-1) = 6 \qquad x+2 = 6 \qquad x = 4$$

$$\{(4,-1)\}$$

29) Find the value of x for $\begin{cases} 2x-4y+3z = 17 \\ x+2y-z = 0 \\ 4x-y-z = 6 \end{cases}$

$$\begin{array}{r} 2x-4y+3z = 17 \\ 3x+6y-3z = 0 \\ \hline 5x+2y = 17 \end{array}$$

$$\begin{array}{r} x+2y-z = 0 \\ -4x+y+z = -6 \\ \hline -3x+3y = -6 \text{ or } -x+y = -2 \end{array}$$

$$-x+y = -2$$

$$\begin{array}{r} 5x+2y = 17 \\ 2x-2y = 4 \\ \hline 7x = 21 \end{array} \qquad x = 3$$

30) Graph $\begin{array}{l} x+y \le 2 \\ x-y \le -2 \end{array}$