V02

MAT 099 Midterm Part 1 50 Points
Chapters 1 - 4 Spring, 2012 Name KEY

Do your own work. There are up to 10 Bonus Points available. So choose the 10 points you want to try for and write the word OMIT next to all the ones you don't.

1. (10 pts) Solve the system of linear equations by the elimination method:

$$x+y-3z=24$$
$$3x \quad -z=50$$
$$-2x-y+5z=-39$$

$-3(x+y-3z=24)$

$-3x-3y+9z=-72$

$3x \quad -z=50$

$-3y+8z=-22$

2nd System:

$x+y-3z=24$

$-3y+8z=-22$

$y-z=9$

$2(x+y-3z=24)$

$2x+2y-6z=48$

$-2x-y+5z=-39$

$y-z=9$

OR $x+y-3z=24$

$y-z=9$

$-3y+8z=-22$

$3(y-z=9)$

$3y-3z=27$

$-3y+8z=-22$

$5z=5$

$z=1$

3rd $x+y-3z=24$

$-3y+8z=-22$

$\boxed{z=1}$

$-3y+8(1)=-22$

$-3y=-30$

$\boxed{y=10}$

$x+10-3(1)=24$

$x+7=24$

$\boxed{x=17}$

$(x,y,z) \in \{(17,10,1)\}$

2. Solve the absolute value inequalities.

a. (5 pts) $|2x-3|>5$

$2x-3>5$ OR $2x-3<-5$

$2x>8$ $\quad 2x<-2$

$x>4$ OR $x<-1$

$x \in (-\infty,-1) \cup (4,\infty)$

$= \{x \mid x<-1 \text{ OR } x>4\}$

b. (5 pts) $|2x-3|>-5$

$(-\infty,\infty)$

3. Multiply:

a. (5 pts) $(x+5)(x-3)$ $= x^2-3x+5x-15$

$= \boxed{x^2+2x-15}$

b. (5 pts) $(x-3)(2x^2+5x+6)$

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

$\quad -6x^2-15x-18$

$\boxed{2x^3-x^2-9x-18}$

$8-6=2$

$(8)(-6)=-48$

4. ~~Solve by factoring.~~

a. (5 pts) $x^2-16=0$

$(x-4)(x+4)=0$

$x-4=0$ OR $x+4=0$

$\boxed{x=4 \text{ OR } x=-4}$

b. (5 pts) $x^2+2x-48=0$

$x^2+8x-6x-48=0$

$x(x+8)-6(x+8)=0$

$(x+8)(x-6)=0$

$x+8=0$ OR $x-6=0$

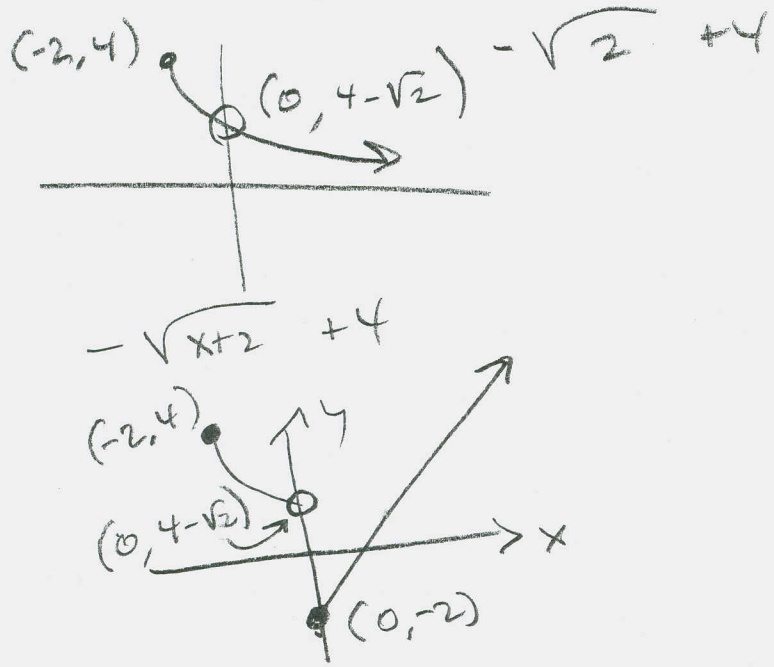
$\boxed{x=-8 \text{ OR } x=6}$

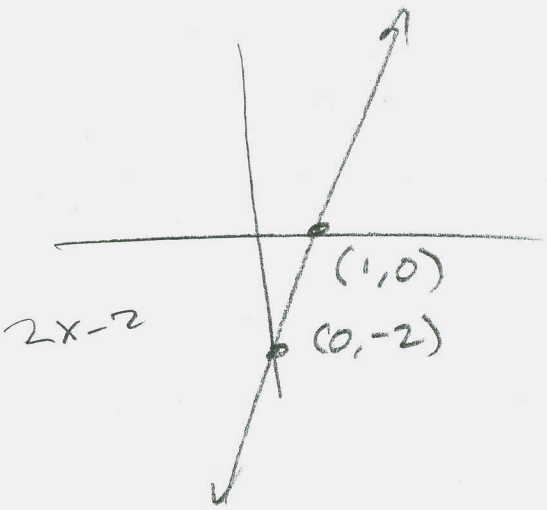
Bonus – Answer up to 10 points'-worth

Bonus (5 pts) Graph the piecewise-defined function $f(x)=\begin{cases} -\sqrt{x+2}+4 & \text{if } x<0 \\ 2x-2 & \text{if } x\geq 0 \end{cases}$

Bonus (5 pts) Find the *real* solution of the equation $x^3-64=0$ by factoring.

Bonus (5 pts) Find an equation of the line through (- 6, 7) that is perpendicular to the line through (2, 1) and (-5, 6).





$x^3-64 = x^3-4^3 = (x-4)(x^2+4x+16)=0 \longrightarrow$

$x=4$

$m=\frac{6-1}{-5-2}=\frac{5}{-7} \longrightarrow m_{\perp}=+\frac{7}{5} \longrightarrow$

↳ slope of perpendicular line.

$y=m_{\perp}(x-x_1)+y_1$

$y=\frac{7}{5}(x-(-6))+7$ ← Plug in (-6,7)

5. (5 pts) Simplify $\left(\frac{2x^{-2}y^{3}z^{5}}{x^{-5}y^{7}z^{-5}}\right)^{5}$. Your final answer should involve only positive exponents.

$= \left(\frac{2x^{5}y^{3}z^{5}z^{5}}{x^{2}y^{7}}\right)^{5} = \left(\frac{2x^{3}z^{10}}{y^{4}}\right)^{5}$

$= \frac{2^{5}x^{15}z^{50}}{y^{20}}$

6. (5 pts) Graph the system of inequalities $2x-5y\le 10$, $x\ge 0$, $y\ge 0$