Math 123
Exam 2
10/20/13

Name Key

Show All work

1) Solve by factoring or the quadratic formula

a) $x^2 + 5x = 6$

$x^2 + 5x - 6 = 0$

$(x+6)(x-1) = 0$

$x+6=0$ or $x-1=0$

$x=-6$ or $x=1$

b) $x^2 + 2x - 6 = 0$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-2 \pm \sqrt{2^2-4\cdot 1\cdot(-6)}}{2} = \frac{-2 \pm \sqrt{4+24}}{2}$$

$$= \frac{-2 \pm \sqrt{28}}{2} = \frac{-2 \pm 2\sqrt{7}}{2} = \frac{2(-1 \pm \sqrt{7})}{2} = -1 \pm \sqrt{7}$$

2) The slope of a horizontal line is 0

3) Find the slope of the line through (1, 4) and (2, -5)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5-4}{2-1} = \frac{-9}{1} = -9$$

4) Find the slope of the line $4y - 3x = 12$

$4y = 3x + 12$

$y = \frac{3}{4}x + 3$

slope $= m = \frac{3}{4}$

5) Graph $4y - 3x = 12$ (make sure to label the intercepts)

If $x = 0$

$4y = 12$

$y = 3$

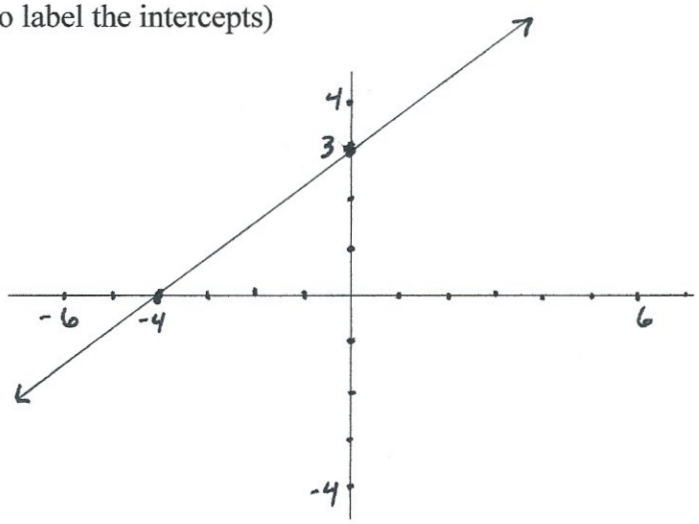
$(0, 3)$

If $y = 0$

$-3x = 12$

$x = -4$

$(-4, 0)$



6) Any line perpendicular to $y = 7x + 2$ must have slope $\frac{-1}{7}$.

7) Find the equation of the line through (-2, 4) with slope 2.

$y - y_1 = m(x - x_1)$

$y - 4 = 2(x - -2)$

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

$y - 4 = 2x + 4$

$y = 2x + 8$

8) In the year 2000 a mathematical model for a company's income (in billions) was found to be $f(x) = 1.2 + 0.3x$ where $x = 0$ corresponds to 1988. What should their income be if that model still holds true for 2013?

$2013 \rightarrow x = 25$

$f(25) = 1.2 + (0.3)(25)$

$= 1.9 + 7.5$

$= 8.7$ billion

9) Solve each inequality.

a) $2t + 3 > 3t - 1$ (add a graph for this one)

$3 > t - 1$

$4 > t$

$\boxed{t < 4}$

b) $4 \leq 1 - 3x \leq 10$

$3 \leq -3x \leq 9$

$\frac{3}{-3} \geq x \geq \frac{9}{-3}$

$-1 \geq x \geq -3$ ← Acceptable

re written

$\boxed{-3 \leq x \leq -1}$ ← Best

c) $|2x + 3| \geq 1$

$2x+3 \geq 1$ OR $2x+3 \leq -1$

$2x \geq -2$ $\quad$ $2x \leq -4$

$\boxed{x \geq -1 \quad \text{OR} \quad x \leq -2}$

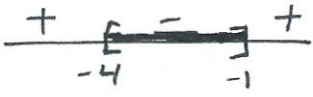
d) $x^2 + 5x + 4 \leq 0$

$(x+4)(x+1) \leq 0$

at -5: $(-1)(-4) = 4 > 0$

at -3: $(1)(-2) = -2 < 0$

at 0 $(4)(1) = 4 > 0$



ANSWER

$[-4, -1]$

10) Find the domain of $f(x) = \sqrt{x+3}$

$x+3 \geq 0$

$x \geq -3$

$\{x \mid x \geq -3\}$

11) If $h(x) = 2x^2 - 5x$ find

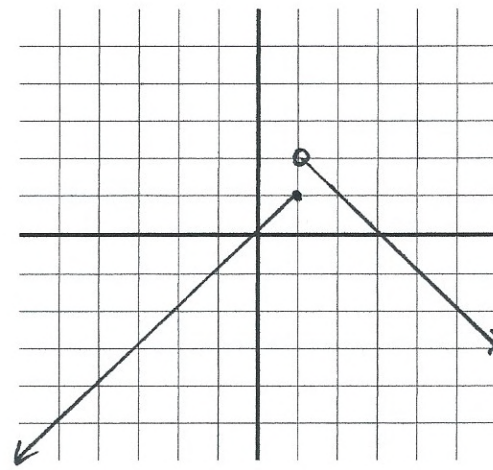
a) h(-2) $= 2(-2)^2 - 5(-2) = 2 \cdot 4 + 10 = 8 + 10 = 18$

b) h(4) $= 2 \cdot 4^2 - 5 \cdot 4 = 2 \cdot 16 - 20 = 32 - 20 = 12$

12) Graph $\begin{cases} x & \text{if } x \leq 1 \\ -x+3 & \text{if } x > 1 \end{cases}$

If $x \leq 1$: $y = x$, slope 1, y int 0

If $x > 1$: $y = -x+3$, slope -1, y-int 3



13) Graph g(x) = | x - 1 |

x	g(x)
-3	$\lvert -4 \rvert = 4$
-2	$\lvert -3 \rvert = 3$
-1	$\lvert -2 \rvert = 2$
0	$\lvert -1 \rvert = 1$
1	$\lvert 0 \rvert = 0$
2	$\lvert 1 \rvert = 1$
3	$\lvert 2 \rvert = 2$

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