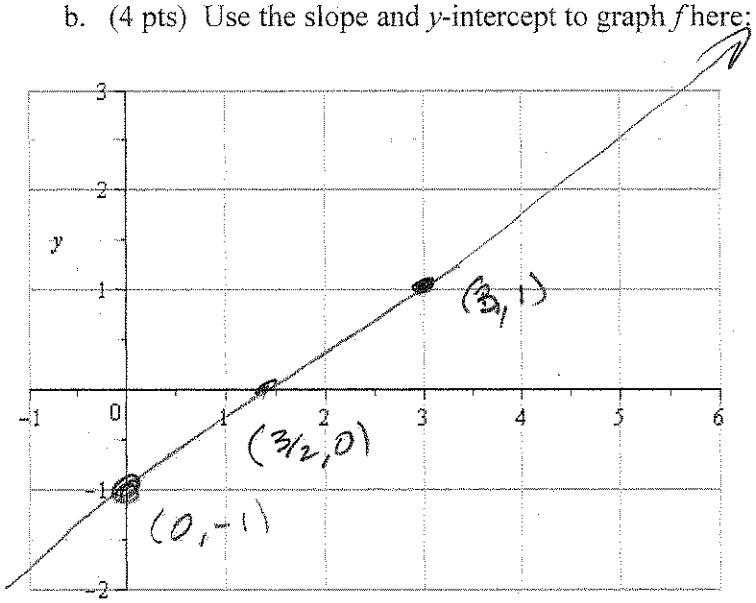
MAT 121-G81, Fall, 2012 Test 2
100 Points Name_____

1. Let $f(x)=\frac{2}{3}x-1$ in the following:

a. (4 pts) Determine the slope and y-intercept of f.

$m = \frac{2}{3}$ & $(0,b) = (0,-1)$

b. (4 pts) Use the slope and y-intercept to graph f here:



c. (4 pts) What is the x-intercept of f?

$\frac{2}{3}x = 1$

$x = \frac{3}{2} \rightsquigarrow (\frac{3}{2}, 0)$

d. (4 pts) Is f increasing, decreasing or constant?

Increasing

2. Compute the discriminant for the following quadratic functions. Find how many zeroes does h have, and whether they are real, nonreal, one of each, or what have you.

a. (4 pts) $h(x)=4x^2-8x+5$ $b^2-4ac = (-8)^2-4(4)(5)$

$= 64-80 = -16$

Two nonreal

b. (4 pts) $h(x)=10x^2-19x+6$

$b^2-4ac = (-19)^2-4(10)(6)$

$= 361-240 = 121$ Two real (rational)

3. Let $f(x)=10x^2-19x+6$.

a. (4 pts) Find the zeros of f by factoring.

Factors of 60 whose sum is -19

2 | 60
2 | 30
3 | 15
5

$(-15)(-4)=60$

$-15-4=-19$

$10x^2-15x-4x+6=0$

$5x(2x-3)-2(2x-3)=0$

$(2x-3)(5x-2)=0$

$x\in\left\{\frac{3}{2},\frac{2}{5}\right\}$

b. (4 pts) Find the zeros of f by quadratic formula.

$b^2-4ac=(-19)^2-4(10)(6)$

$=361-240=121$

$\sqrt{121}=11$

$x=\frac{19\pm 11}{2(10)}=\begin{cases}\frac{30}{20}=\frac{3}{2}\\ \frac{8}{20}=\frac{2}{5}\end{cases}$

$x\in\left\{\frac{2}{5},\frac{3}{2}\right\}$

(4 pts) Find the zeros of $f(x)=x^2+2x-35$ by completing the square.

$x^2+2x+1^2=35+1$

$(x+1)^2=36$

$x+1=\pm 6$

$x=-1\pm 6=\begin{cases}5\\ -7\end{cases}$

$x\in\{-7,5\}$

4. (20 pts) Complete the square for $f(x) = x^2 + 2x - 35$, and re-write it in the form $a(x-h)^2 + k$. Sketch its graph, based on your work. Label the vertex, axis of symmetry, and x- and y-intercepts on your graph. State the range of f.

x^2+2x+1^2-1-35

$(x+1)^2-36 \overset{SET}{=} 0$

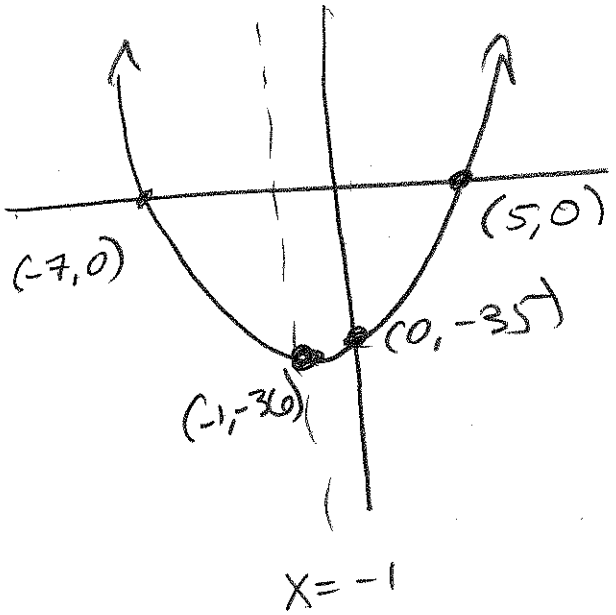
$(x+1)^2 = 36$

$x+1 = \pm 6$

$x \in \{-7, 5\}$

$(h,k) = (-1,-36)$

$(0,b) = (0,-35)$



5. (10 pts) Find the complex zeros of $f(x) = 4x^2 - 8x + 5$. Leave your answer in simplified radical form (no calculator stuff). **(5 bonus points if you solve it by completing the square)**

$4(x^2-2x\quad) = -5$

$4(x^2-2x+1^2) = -5 + 4(1^2)$

$4(x-1)^2 = -5+4 = -1$

$(x-1)^2 = -\frac{1}{4}$

$x-1 = \pm\sqrt{-\frac{1}{4}} = \pm i\frac{\sqrt{1}}{\sqrt{4}} = \pm\frac{1}{2}i$

$a=4, b=-8, c=5$

$b^2-4ac = (-8)^2-4(4)(5)$

$= 64-80 = -16$

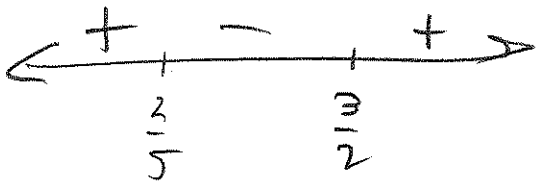
$\sqrt{-16} = 4i$

$x = \frac{8 \pm 4i}{2(4)} = 1 \pm \frac{1}{2}i$

$\boxed{x = 1 \pm \frac{1}{2}i}$

6. (10 pts) Solve $10x^2 - 19x \geq -6$. Express your answer in both set-builder and interval notation. You've already done about half the work on this one, in #3, on page 2.

$10x^2 - 19x + 6 \geq 0$



$x \in (-\infty, \frac{2}{5}] \cup [\frac{3}{2}, \infty)$

Solve the absolute value equations and inequalities. (4 pts each). Same work for 7 – 9. Just interpret the results, differently.

7. $|4x+3| = 7$

8. $|5x-1| > 7$

9. $|5x-1| \leq 7$

10. $|5x-1| \leq -7$

11. $|5x-1| > -7$

12. $|5x-1| = -7$