Math 71 Spring 09 QUIZ #3 @ 55 points Name:

Write neatly. Show all work. Write all the solutions on separate paper.

1. Solve by the square root property in the set of complex numbers:

$$25(x-1)^2+16=0.$$

2. Solve by completing the square in the set of complex numbers:

$$3x^2+6x+1=0$$

3. Solve by the quadratic formula in the set of complex numbers:

$$3x^2=8x-7$$

4. Identify the vertex of the parabola. State whether it is maximum or minimum. State the domain and the range of the quadratic function:

$$f(x)=\frac{1}{2}(x+3)^2-5$$

5. Let $y=x^2-2x-15$

a) Graph the function. Show all work. Label all points and the axes.

b) State the domain and range.

c) Using the graph, solve the following inequality: $x^2-2x-15\leq 0$

d) Write the equation in vertex form.

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Quiz 3 - Solutions

① $25(x-1)^2+16=0$

$25(x-1)^2=-16$

$(x-1)^2=\frac{-16}{25}$ $\quad /\sqrt{\ }$

$\sqrt{(x-1)^2}=\sqrt{\frac{-16}{25}}$

$x-1=\pm\frac{4i}{5}$

$$\boxed{x=1\pm\frac{4i}{5}}$$

② $3x^2+6x+1=0$ $\quad /\div 3$

STEP 1 - Leading coefficient = 1

$x^2+2x+\frac{1}{3}=0$

STEP 2 - isolate the constant

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

STEP 3. Find missing term

$\left(\frac{1}{2}\text{ coefficient } x\right)^2=\left(\frac{1}{2}\cdot 2\right)^2=1$

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

$(x+1)^2=\frac{2}{3}$ $\quad /\sqrt{\ }$

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

$x+1=\pm\frac{\sqrt{2}}{\sqrt{3}}$

$$\boxed{x=-1\pm\frac{\sqrt{6}}{3}}$$

③ $3x^2=8x-7$

$3x^2-8x+7=0$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x=\frac{-(-8)\pm\sqrt{(-8)^2-4(3)(7)}}{2(3)}$

$x=\frac{8\pm\sqrt{64-84}}{6}$

$x=\frac{8\pm\sqrt{-20}}{6}=\frac{8\pm 2i\sqrt{5}}{6}$

$x=\frac{2(4\pm i\sqrt{5})}{6}$

$$\boxed{x=\frac{4\pm i\sqrt{5}}{3}}$$

④ $f(x)=\frac{1}{2}(x+3)^2-5$

$V(-3,-5)$

$a=\frac{1}{2}>0$ so the parabola opens upward

, then the

$V(-3,-5)$ = minimum

Domain: $x\in\mathbb{R}$

Range: $y\in[-5,\infty)$

(5) $y = x^2 - 2x - 15$

(a) parabola opening up

$\underline{V(x_v, y_v)}$ $\quad x_v = \frac{-b}{2a}$

$x_v = \frac{-(-2)}{2} = 1$

$y_v = 1^2 - 2(1) - 15 = -16$

$V(1, -16)$

$\underline{x\text{-}n}$: let $y = 0$

$x^2 - 2x - 15 = 0$

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

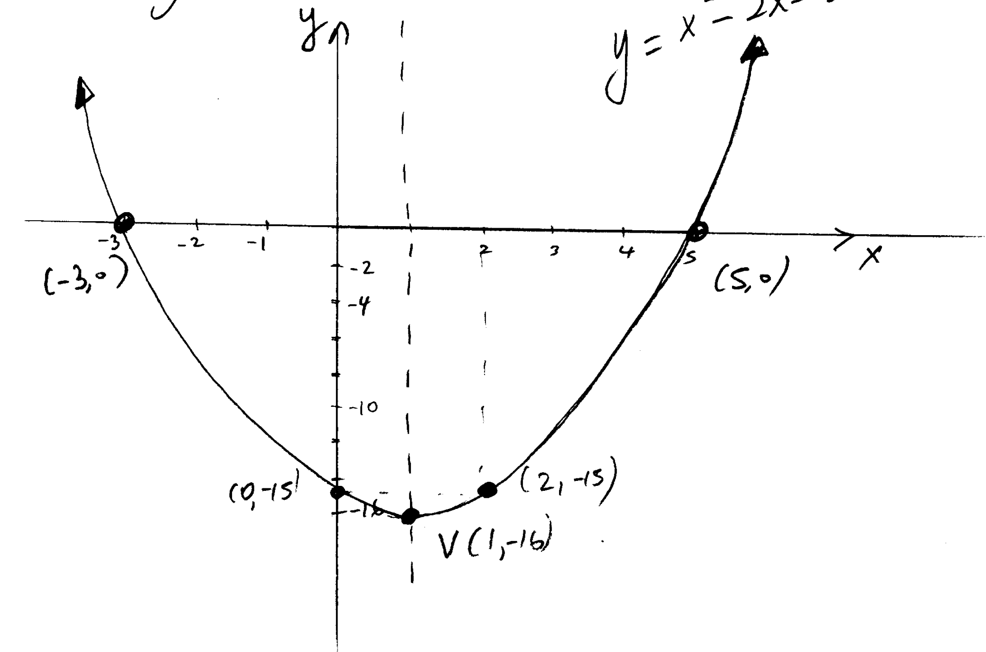
$x = 5, \quad x = -3$

x-n: $(5,0)$ and $(-3,0)$

$\underline{y\text{-}n}$: let $x = 0$

$y = -15$

y-n: $(0,-15)$



(b) Domain: $x \in \mathbb{R}$

Range: $y \in [-16, \infty)$

(c) $x^2 - 2x - 15 \leq 0$

$\iff$

$y \leq 0$

$\iff$

$x \in [-3, 5]$

(d) $y = a(x - x_v)^2 + y_v$

$y = 1(x-1)^2 + (-16)$

$y = (x-1)^2 - 16$