Name: _____ Date: _____ #64 Solving from vertex form

Simplify each of the following:

$\sqrt{-80}$

$\sqrt{16 \cdot -1 \cdot 5}$

$\pm 4i\sqrt{5}$

$\sqrt{-25}$

$\sqrt{25 \cdot -1}$

$\pm 5i$

$\sqrt{200}$

$\sqrt{100 \cdot 2}$

$\pm 10\sqrt{2}$

$\sqrt{-275}$

$\sqrt{25 \cdot -1 \cdot 11}$

$\pm 5i\sqrt{11}$

$\sqrt{-48}$

$\sqrt{16 \cdot -1 \cdot 3}$

$\pm 4i\sqrt{3}$

$\sqrt{243}$

$\sqrt{81 \cdot 3}$

$\pm 9\sqrt{3}$

$\sqrt{-98}$

$\sqrt{49 \cdot -1 \cdot 2}$

$\pm 7i\sqrt{2}$

$\sqrt{-225}$

$\sqrt{225 \cdot -1}$

$\pm 15i$

$\sqrt{-23}$

$\sqrt{-1 \cdot 23}$

$\pm i\sqrt{23}$

$\sqrt{-320}$

$\sqrt{64 \cdot -1 \cdot 5}$

$\pm 8i\sqrt{5}$

Do the rest on your own paper!

Solve each quadratic below. Then, give the number and type of solutions, its domain, range, and vertex.

1. $f(x) = \frac{1}{4}(x+4)^2 + 3$

2. $g(x) = (x+2)^2 - 1$

3. $h(x) = -2(x+5)^2 - 8$

4. $k(x) = (x-2)^2$

1. $f(x) = (x-6)^2 + 6$

6. $d(x) = \frac{1}{2}(x-1)^2 - 1$

7. $a(x) = 8(x+1)^2 - 2$

8. $g(x) = -3(x-1)^2 + 3$

9. $r(x) = \frac{1}{8}(x+1)^2 - 1$

10. $f(x) = \frac{1}{2}(x+6)^2 - 2$

11. $g(x) = -2(x+1)^2$

See next pages

HW 64

① $f(x) = \frac{1}{4}(x+4)^2+3$

$0 = \frac{1}{4}(x+4)^2+3$

$-3 \qquad -3$

$-3 = \frac{1}{4}(x+4)^2$ ·4

$-12 = (x+4)^2$

$x+4 = \sqrt{-12}$

$x+4 = \sqrt{4 \cdot -1 \cdot 3}$

$x+4 = \pm 2i\sqrt{3}$

$-4 \quad -4$

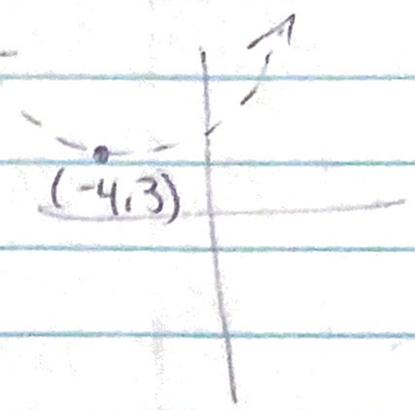
$\boxed{x = -4 \pm 2i\sqrt{3}}$

2 complex sol'n

D: $(-\infty, \infty)$

Vertex $(-4, 3)$

R: $[3, \infty)$



② $g(x) = (x+2)^2 - 1$

$0 = (x+2)^2 - 1$

$+1 \qquad +1$

$1 = (x+2)^2$

$\pm 1 = x+2$

$x+2 = 1$ or $x+2 = -1$

$-2 \ -2 \qquad -2 \ -2$

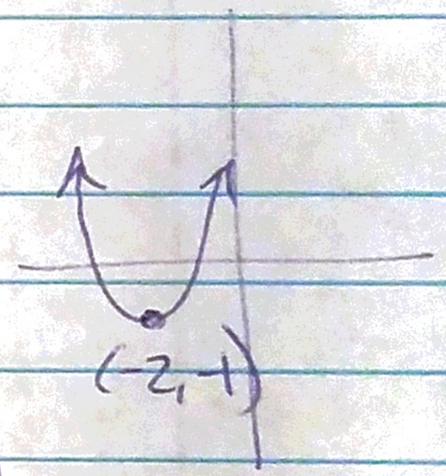
$\boxed{x = -1}$ or $\boxed{x = -3}$

2 real sol'n

D $(-\infty, \infty)$

Vertex $(-2, -1)$

R: $[-1, \infty)$



③ $h(x) = -2(x+5)^2 - 8$

$0 = -2(x+5)^2 - 8$

$+8 \qquad +8$

$8 = -2(x+5)^2$

$\frac{8}{-2} = \frac{-2(x+5)^2}{-2}$

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

$\pm 2i = x+5$

$-5 \quad -5$

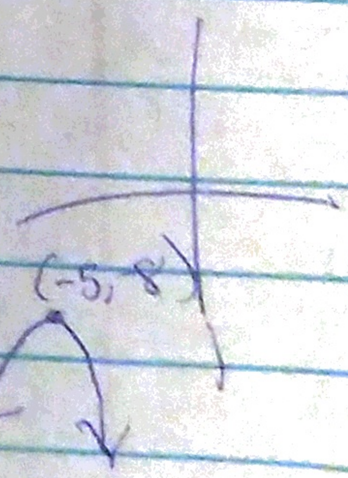
$\boxed{x = -5 \pm 2i}$

2 complex sol'n

Di $(-\infty, \infty)$

Vertex: $(-5, -8)$

R: $(-\infty, -8]$



(4) $K(x)=(x-2)^2$

$0=(x-2)^2$

$0=x-2$

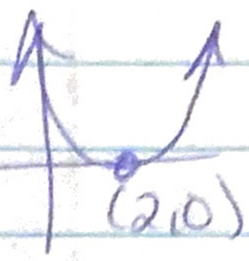
$+2 \quad +2$

$2=x$

1 real (repeated) sol'n

D: $(-\infty,\infty)$

Vertex $(2,0)$ R: $[0,\infty)$



(5) $f(x)=(x-6)^2+6$

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

$-6 \quad -6$

$-6=(x-6)^2$

$x-6=\pm i\sqrt{6}$

$+6 \quad +6$

$x=6\pm i\sqrt{6}$

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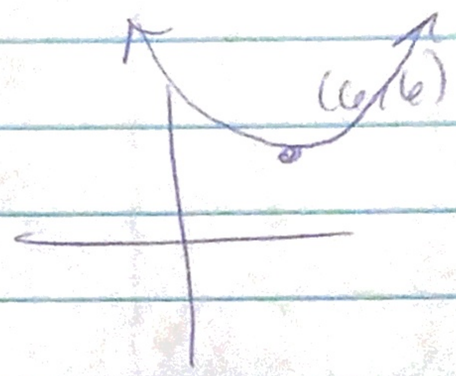
2 complex sol'n

D $(-\infty,\infty)$

Vertex $(6,6)$

R: $[6,\infty)$



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

$0=\frac{1}{2}(x-1)^2-1$

$+1 \quad +1$

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

$2=(x-1)^2$

$x-1=\pm\sqrt{2}$

$+1 \quad +1$

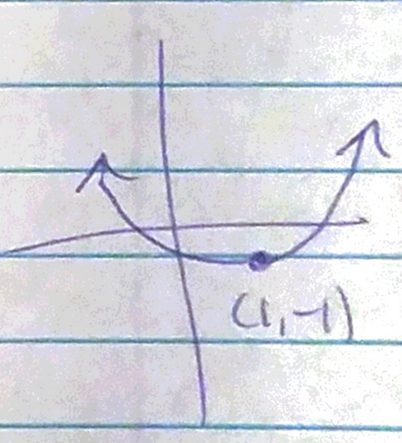
$x=1\pm\sqrt{2}$ or $\begin{cases} x=1+\sqrt{2} & \& \quad x=1-\sqrt{2} \\ \approx 1+1.41 & \approx 1-1.41 \\ x\approx 2.41 & \text{or} \quad x\approx -0.41 \end{cases}$

2 real sol'n (irrational)

D: $(-\infty,\infty)$

Vertex $(1,-1)$

R: $[-1,\infty)$



(7) $a(x) = 8(x+1)^2 - 2$

$0 = 8(x+1)^2 - 2$

$+2 \qquad +2$

$\frac{2}{8} = \frac{8(x+1)^2}{8}$

reduce

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

$\frac{\sqrt{1}}{\sqrt{4}} = x+1$

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

$x+1 = \frac{1}{2}$ or $x+1 = -\frac{1}{2}$

$-\frac{1}{2} \quad -\frac{1}{2} \qquad -\frac{1}{2} \quad -\frac{1}{2}$

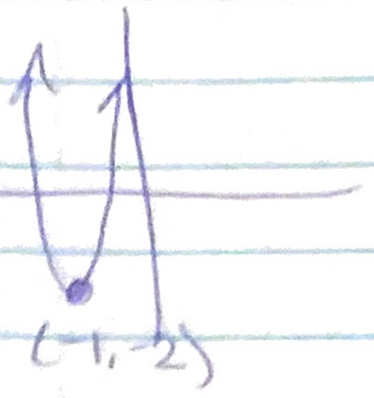
$x = -\frac{1}{2}$ or $x = -\frac{3}{2}$

2 real sol'n

D $(-\infty, \infty)$

Vertex $(-1, -2)$

R $[-2, \infty)$



(8) $g(x) = -3(x-1)^2 + 3$

$0 = -3(x-1)^2 + 3$

$-3 \qquad -3$

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

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

$\pm 1 = x-1$

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

$+1 \ +1 \qquad +1 \ +1$

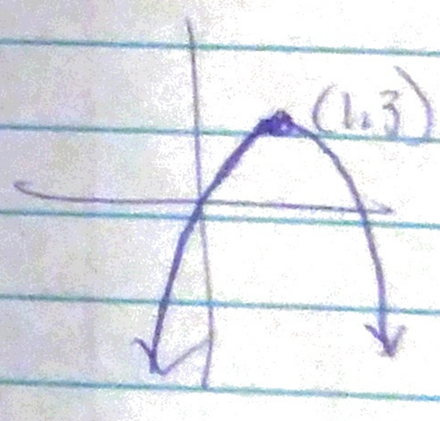
$x = 2$ or $x = 0$

2 real sol'n

D $(-\infty, \infty)$

Vertex $(1, 3)$

R $(-\infty, 3]$



(9) $r(x) = \frac{1}{8}(x+1)^2 - 1$

$0 = \frac{1}{8}(x+1)^2 - 1$

$+1 \quad +1$

$8 \cdot 1 = \frac{1}{8}(x+1)^2 \cdot 8$

$\sqrt{8} = \sqrt{(x+1)^2}$

$x+1 = \sqrt{8}$

$x+1 = \sqrt{4 \cdot 2}$

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

$-1 \quad -1$

$x = -1 \pm 2\sqrt{2}$

or $x = -1 + 2\sqrt{2}$ or $x = -1 - 2\sqrt{2}$

$\approx -1 + 2.83$ $\approx -1 - 2.83$

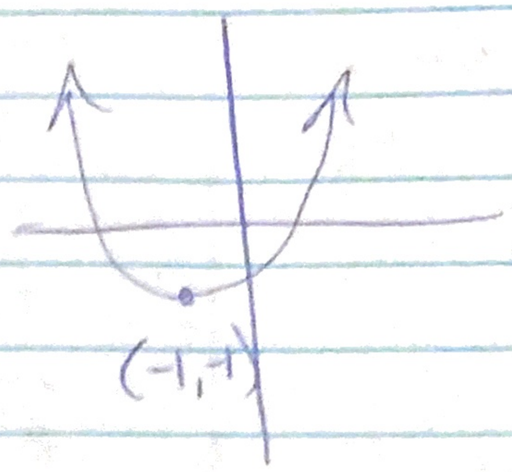
≈ 1.83 ≈ -3.83

2 real sol'n (irrationals)

D $(-\infty, \infty)$

Vertex $(-1, -1)$

R $[-1, \infty)$



(10) $f(x) = \frac{1}{2}(x+6)^2 - 2$

$0 = \frac{1}{2}(x+6)^2 - 2$

$+2 \quad +2$

$2 \cdot 2 = \frac{1}{2}(x+6)^2 \cdot 2$

$\sqrt{4} = \sqrt{(x+6)^2}$

$x+6 = \pm 2$

$x+6 = 2$ or $x+6 = -2$

$-6 \quad -6$ $\quad -6 \quad -6$

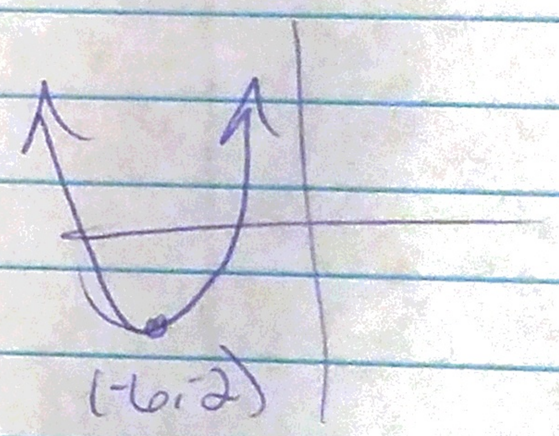
$x = -4$ $\quad x = -8$

2 real sol'n

D $(-\infty, \infty)$

Vertex $(-6, -2)$

R $[-2, \infty)$



(11) $g(x) = -2(x+1)^2$

$0 = -2(x+1)^2$

$-2 \quad -2$

$\sqrt{0} = \sqrt{(x+1)^2}$

$0 = x+1$

$-1 \quad -1$

$-1 = x$

1 real (repeated) sol'n

D $(-\infty, \infty)$

Vertex $(-1, 0)$

R $(-\infty, 0]$