INTERMEDIATE ALGEBRA **TEST 4** 98 Excellent! NAME: Parul Patel

Be sure to set up each problem before evaluation. Show all work in the space provided for full credit.

1. Graph the following parabola. Label at least three points. Give the vertex, domain, and range. (16 points)

step① $f(x) = -3x^2 + 12x + 1$ ✓

$a = -3$ $b = 12$ $c = 1$ ✓

② $a < 1$ so Parabola ∩ ✓

③ vertex of $\frac{-b}{2a} = \frac{-12}{-6} = 2$ ✓

$f(2) = -3(2)^2 + 12(2) + 1$

$= -12 + 24 + 1$

$= 13$ ✓

So Vertex $(2, 13)$ ✓

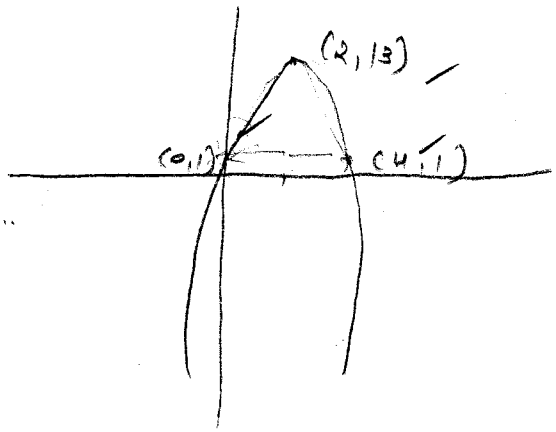
④ Find x & y intercept

Let $x = 0$ y int: $(0, 1)$ ✓

Find opposit point $(4, 1)$ ✓

D: $(-\infty, \infty)$ ✓

R: $(-\infty, 13]$ ✓



2. A rocket is fired upward. After x hour, the height of the rocket is given by $f(x) = -4x^2 + 16x$. Find the time required in hours for the rocket to reach maximum height, and find the maximum height in kilometers. (12 points) -0

$a = -4$ ✓

$b = 16$ ✓

$c = 0$ ✓

Find Vertex $= \frac{-b}{2a}$ ✓

$= \frac{-16}{2(-4)}$ ✓

$= 2$ hr (In 2 hr) ✓

$f(x) = -4x^2 + 16x$

$= -4(2)^2 + 16(2)$

$= -16 + 32$ ✓

$= 16$ height in km. (maximum) ✓

So vertex $= (2, 16)$ ✓ ✓

✓ good!

3. Graph each parabola. Plot at least two points in addition to the vertex. Give the vertex, domain, and range.

a) $f(x) = 4(x-2)^2$ (8 points)

$y = a(x-h)^2 + k$

Vertex: (h, k) is $(2, 0)$

Find opposit point

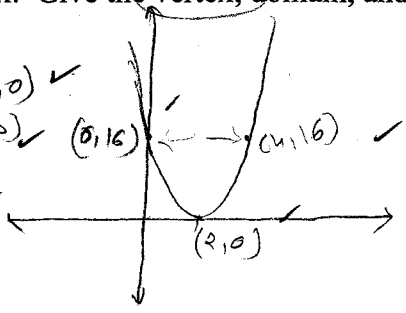
x	y
2	0
4	16

✓

vertex: $(2, 0)$ ✓

D: $(-\infty, \infty)$ ✓

R: $[0, \infty)$ ✓



b) $f(x) = 4(x+2)^2 + 5$ (8 points)

$y = a(x-h)^2 + k$

Vertex: (h, k) is $(-2, 5)$

Find opposit Point

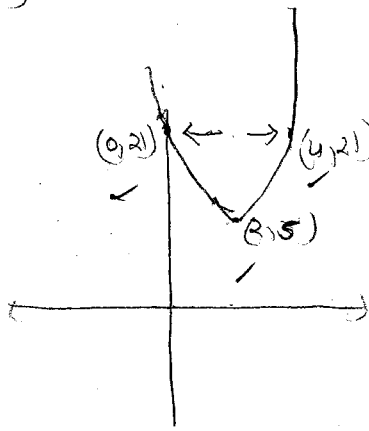
x	y
-2	5
-4	21

✓

Vertex: $(-2, 5)$ ✓

D: $(-\infty, \infty)$ ✓

R: $[5, \infty)$ ✓



4. Use the square root property to solve the following equation and give the solution set. (12 points)

$3(x-5)^2 = 27$

$\frac{3(x-5)^2}{3} = \frac{27}{3}$

$(x-5)^2 = 9$

$x-5 = \pm\sqrt{9}$

$x-5 = \pm 3$

$x-5 = 3$ or $x-5 = -3$

$x = 8$ or $x = 2$

Sol. set: $\{2, 8\}$

−4

5. Solve the following equation by completing the square and give the solution set. (16 points)

$2x^2 - 12x - 14 = 0$

$\frac{2(x^2 - 6x - 7)}{2} = \frac{0}{2}$

$x^2 - 6x = 7$

$x^2 - 6x + 9 = 7 + 9$

$(x-3)^2 = 16$

$x-3 = \pm\sqrt{16}$

$x-3 = \pm 4$

$x-3 = 4$ or $x-3 = -4$

$x = 7$ or $x = -1$

Sol. set: $\{x \mid x = -1 \text{ or } 7\}$

v. good!

6. Solve the following equation using the quadratic formula and give the solution set. (14 points)

$5x^2 - 2x + 3 = 0$ $\quad a = 5 \quad b = -2 \quad c = 3$

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

$= \frac{2 \pm \sqrt{4 - 4(5)(3)}}{2(5)}$

$= \frac{2 \pm \sqrt{4 - 60}}{10}$

$= \frac{2 \pm \sqrt{-56}}{10}$

$= \frac{2}{10} \pm \frac{2\sqrt{14}\,i}{10}$

$= \frac{1}{5} \pm \frac{\sqrt{14}}{10} i$

Sol. set: $\left\{\frac{1}{5} \pm \frac{\sqrt{14}}{5} i\right\}$

−4

7. Use the discriminant to predict whether the solutions to each equation are
A. *one real solution*; B. *two real solutions*; C. *two complex solutions*.

a) $-2x^2 + 6x + 3 = 0$ (8 points)

To find discriminant

$b^2 - 4ac$ $\quad a = -2, \; b = 6, \; c = 3$

$= 36 - 4(-2)(3)$

$= 36 + 24$

$= 60 > 0$

So, two real sol. Ans B

b) $x^2 - x + 10 = 0$ (8 points)

$b^2 - 4ac$ $\quad a = 1, \; b = -1, \; c = 10$

$= 1 - 4(1)(10)$

$= 1 - 40$

$= -39 < 0$

So, two complex sl.

Ans C