East Los Angeles College
Department of Mathematics
Math 125
Test 3

solutions

Show all work for credit.

Solve for x.

1. $\sqrt{2x-8}=5$

2. $\sqrt{x-8}=\sqrt{2x-3}$

3. $-6\sqrt{x-3}+8=-16$

4. $x=\sqrt{x+13}+7$

Solve the following equations for x by completing the square.

5. $x^2-4x+7=0$

6. $2x^2-4x+5=0$

$$y=x^2-6x+3$$

7. Complete the square to write in graphing form

Determine the following:
8. Vertex

9. Axis of symmetry

10. Opens up/down

11. x-intercepts, if any.

12 y-intercepts.

13. Sketch the curve.

$$y = -3x^2 + 12x + 6$$

14. Complete the square to write in graphing form.

Determine:
15. Vertex

16. Axis of symmetry

17. Opens up/down

18. x-intercepts, if any.

19. y-intercepts.

20. Sketch the curve.

$$x^2 + y^2 - 8x + 2y + 13 = 0$$

21. Complete the square and determine the equation of this circle.

22. What is the center of this circle?

23. What is the radius of this circle?

24. Graph this circle.

$$12(x - 2)^2 + 3(x - 4)^2 = 48$$

25. Determine the equation of this ellipse.

26. Determine the center of the ellipse.

27. Determine the a and b values.

28. Graph the ellipse.

$$25x^2 - 4y^2 = 100$$

29. Determine the equation of the hyperbola.

30. Determine the center of the hyperbola.

31. Determine the a and b values.

32. Graph the hyperbola.

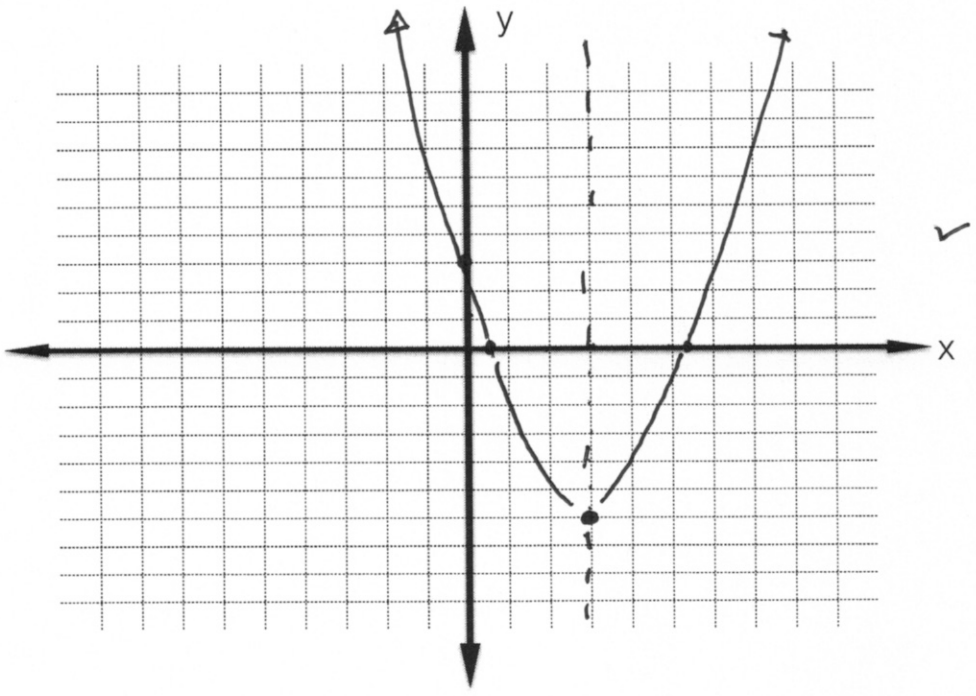
Answer Sheet

1	$\frac{33}{2}$	17	Down
2	-5	18	$2 \pm \sqrt{6}$ 4.4, −0.4
3	19	19	6
4	12, 3	20	Use Graph Paper
5	$2 \pm \sqrt{3}\,i$	21	$(x-4)^2 + (y+1)^2 = 4$
6	$1 \pm \frac{\sqrt{6}}{2}\,i$	22	(4, −1)
7	$y = (x-3)^2 - 6$	23	2
8	(3, −6)	24	Use Graph Paper
9	3	25	$\frac{(x-4)^2}{4} + \frac{(x-4)^2}{16} = 1$
10	up	26	(2, 4)
11	$3 \pm \sqrt{6}$ 5.4, 0.6	27	$a = \pm 2$; $b = \pm 4$
12	3	28	Use Graph Paper
13	Use Graph Paper	29	$\frac{x^2}{4} - \frac{y^2}{25} = 1$
14	$y = -3(x-2)^2 + 18$	30	(0, 0)
15	(2, 18)	31	$a = \pm 2$; $b = \pm 5$
16	2	32	Use Graph Paper

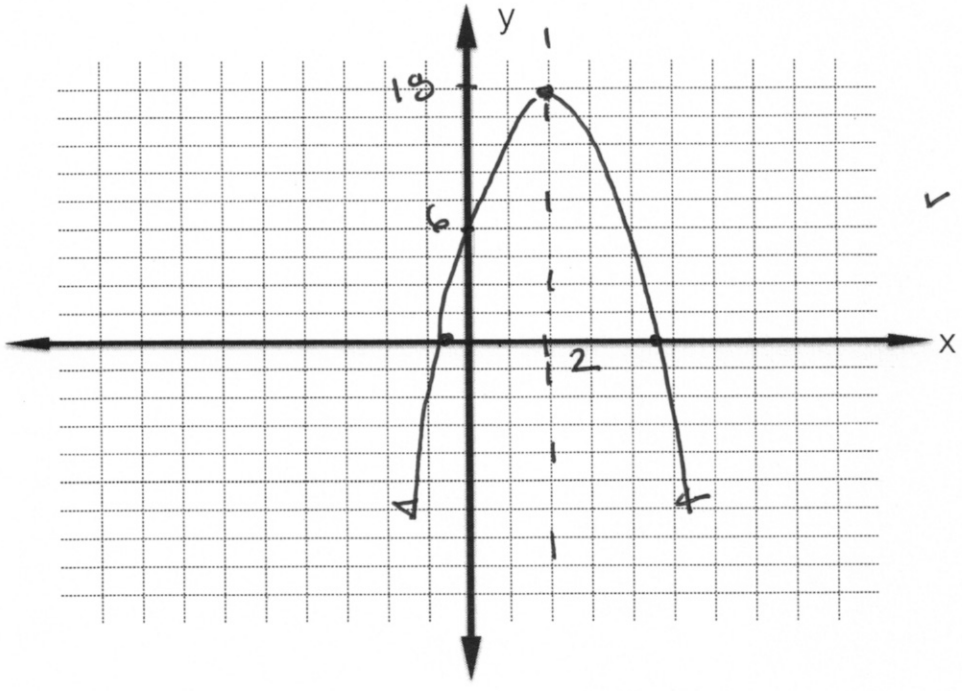
53

Graph

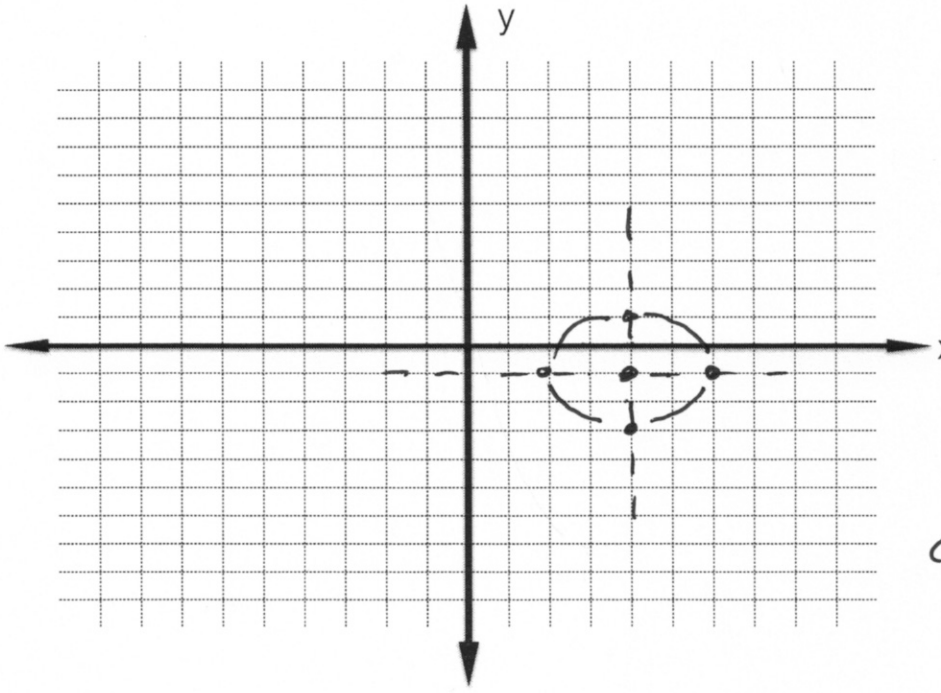
13.



20.



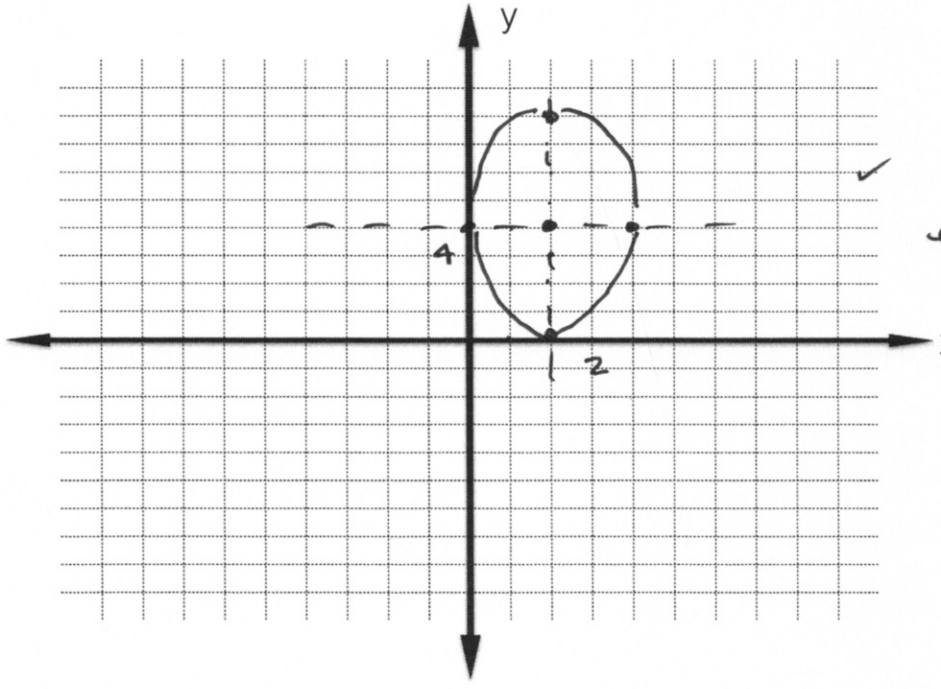
24.



✓

Circle

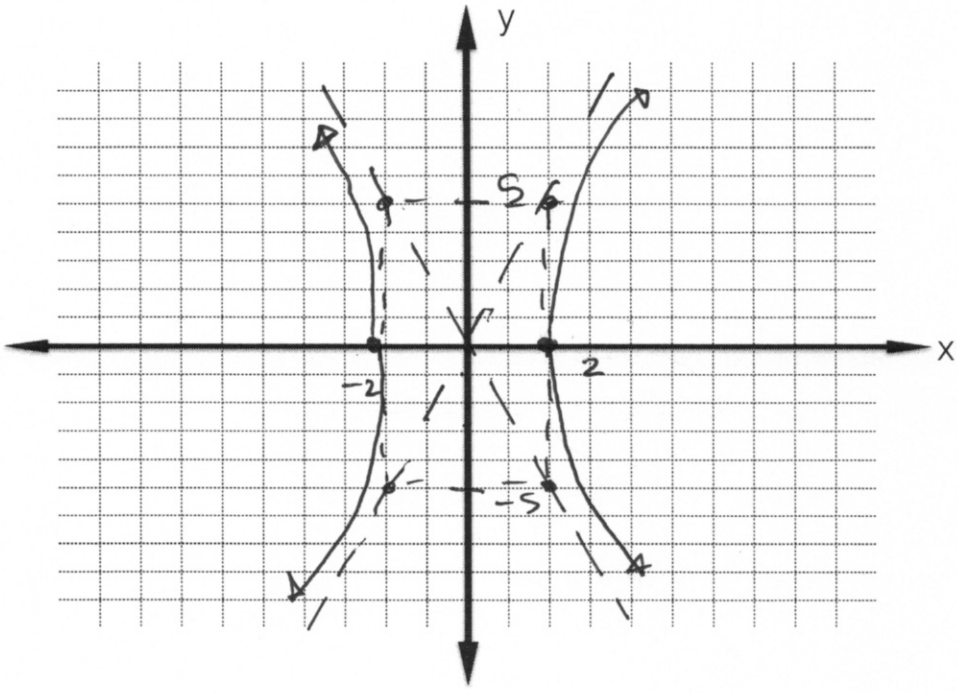
28.



✓

ellipse

32.



Horizontal Hyperbola ✓

Math 125 Test 3

(1) $\left(\sqrt{2x-8}\right)^2 = 5^2$

$2x-8 = 5^2$

$2x-8 = 25$

$+8 \quad +8$

$\frac{2x}{2} = \frac{33}{2}$

$x = \frac{33}{2}$

(2) $\left(\sqrt{x-8}\right)^2 = \left(\sqrt{2x-3}\right)^2$

$x-8 = 2x-3$

$-x \qquad -x$

$-8 = x-3$

$+3 \qquad +3$

$-5 = x$: $x = -5$

(3) $-6\sqrt{x-3} + 8 = -16$

$-8 \quad -8$

$\frac{-6\sqrt{x-3}}{-6} = \frac{-24}{-6}$

$\left(\sqrt{x-3}\right)^2 = 4^2$

$x-3 = 4^2$

$x-3 = 16$

$+3 \quad +3$

$x = 19$

④ $x = \sqrt{x+13} + 7$

$x - 7 = \sqrt{x+13}$

$(x-7)^2 = \left(\sqrt{x+13}\right)^2$

$(x-7)^2 = x + 13$

$(x-7)(x-7) = x + 13$

$x^2 - 14x + 49 = x + 13$
$\quad -x \qquad\quad -x$

$x^2 - 15x + 49 = 13$
$\qquad\quad -13 \quad -13$

$x^2 - 15x + 36 = 0$

$(x-12)(x-3) = 0$

$x - 12 = 0$	$x - 3 = 0$
$+12 \quad +12$	$+3 \quad +3$
$x = 12$	$x = 3$

(15)

$$x^2 - 4x + 7 = 0$$

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

$$\underbrace{x^2 - 4x + 4}_{f} \underbrace{- 4 + 7}_{a} = 0$$

$$(x-2)^2 + 3 = 0$$
$$-3 \quad -3$$
$$(x-2)^2 = -3$$

$$x - 2 = \pm\sqrt{-3}$$
$$+2 \quad +2$$

$$x = 2 \pm \sqrt{-3} \quad \sqrt{3}\,i$$

$$x = 2 \pm \sqrt{3}\,i$$

(16) $\underbrace{2x^2 - 4x + 5}_{2} = \frac{0}{2}$

$$\frac{2x^2}{2} - \frac{4x}{2} + \frac{5}{2} = 0$$

$$x^2 - 2x + \frac{5}{2} = 0$$

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

$$\underbrace{x^2 - 2x + 1}_{f} \underbrace{- 1 + \frac{5}{2}}_{a} = 0$$

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

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

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

$$\sqrt{\frac{3}{2}}\,i \qquad \frac{\sqrt{2}}{\sqrt{2}}\frac{\sqrt{3}}{\sqrt{2}}\,i \qquad \frac{\sqrt{6}}{2}\,i$$

$$x-1 = \pm\frac{\sqrt{6}}{2}\,i$$
$$+1 \quad +1$$

$$x = 1 \pm \frac{\sqrt{6}}{2}\,i$$

(7) $y = x^2 - 6x + 3$

(1) $-\frac{6}{2} = -3$ (2) $(-3)^2 = 9$

$y = x^2 - 6x + 9 - 9 + 3$

$y = (x-3)^2 - 6$

(8) $(3, -6)$ (9) $x = 3$

(10) opens up (11) x-int

$(x-3)^2 - 6 = 0$
$+6 \quad +6$
$(x-3)^2 = 6$

$(x-3)^2 = 6$

$x-3 = \pm\sqrt{6}$

$+3 \quad +3$

$x = 3 \pm \sqrt{6}$

$x = 3+\sqrt{6}$; $x = 3-\sqrt{6}$

$x \approx 5.4$ $\quad$ $x \approx 0.6$

(12) y-int

$y = 0^2 - 6\cdot 0 + 3$; $y = 3$

(14) $\dfrac{y}{-3} = \dfrac{-3x^2 + 12x + 6}{-3}$

$\dfrac{y}{-3} = \dfrac{-3x^2}{-3} + \dfrac{12x}{-3} + \dfrac{6}{-3}$

$\dfrac{y}{-3} = x^2 - 4x - 2$

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

$\dfrac{y}{-3} = x^2 - 4x + 4 - 4 - 2$

f $\quad$ a

$\dfrac{y}{-3} = (x-2)^2 - 6$

$-3\left(\dfrac{y}{-3}\right) = -3\left[(x-2)^2 - 6\right]$

$y = -3(x-2)^2 + 18$

(15) (2, 18)

(16) $x = 2$

(17) opens Down

(18) x-int

$$-3(x-2)^2 + 18 = 0$$

$$-3(x-2)^2 + 18 = 0$$
$$-18 \quad -18$$

$$\frac{-3(x-2)^2}{-3} = \frac{-18}{-3} \quad ; \quad (x-2)^2 = 6$$

$$x - 2 = \pm\sqrt{6}$$
$$+2 \quad +2$$

$$x = 2 \pm \sqrt{6}$$

$x = 2 + \sqrt{6}$; $x = 2 - \sqrt{6}$

$x \approx 4.4$ $\quad$ $x = -0.4$

(19) y-int $\quad y = -3 \cdot 0^2 + 12 \cdot 0 + 6$

$y = 6$

(21) $x^2 + y^2 - 8x + 2y + 13 = 0$

① $\frac{-8}{2} = -4$ $\quad$ ① $\frac{2}{2} = 1$

② $(-4)^2 = 16$ $\quad$ ② $1^2 = 1$

$x^2 + y^2 - 8x$

$$\underline{x^2 - 8x + 16} - 16 + \underline{y^2 + 2y + 1} - 1 + 13 = 0$$

$$(x-4)^2 + (y+1)^2 - 4 = 0$$
$$+4 \qquad +4$$

$$\boxed{(x-4)^2 + (y+1)^2 = 4}$$

Circle $(4, -1)$ ∴ $r = 2$

(22) (23)

(25) $$\frac{12(x-2)^2}{48} + \frac{3(x-4)^2}{48} = \frac{48}{48}$$

$$\frac{12(x-2)^2}{48} + \frac{3(x-4)^2}{48} = 1$$

$$\boxed{\frac{(x-2)^2}{4} + \frac{(x-4)^2}{16} = 1}$$

(26) $(2, 4)$ (27) $a^2 = 4$ $b^2 = 16$

$a = \pm 2$ $b = \pm 4$

(29) $\frac{25x^2 - 4y^2}{100} = \frac{100}{100}$

$\frac{25x^2}{100} - \frac{4y^2}{100} = 1$

$\frac{x^2}{4} - \frac{y^2}{25} = 1$

Horizontal Hyperbola

(30) (0,0) center

(31) $a^2 = 4$ $a = \pm 2$

$b^2 = 25$ $b = \pm 5$