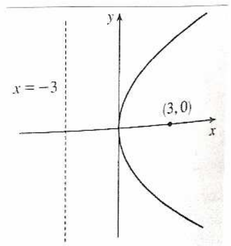
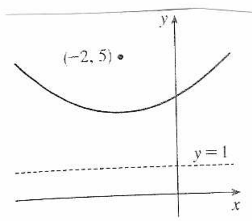
Math 242 Homework Set #8
Due: 10/26/07

Section 11.2

4. $y^2 = 12x, 4p = 12 \Rightarrow p = 3$. The vertex is (0,0), the focus is (3,0), and the directrix is x = -3.



5. $(x+2)^2 = 8(y-3), 4p = 8 \Rightarrow p = 2$. The vertex is (-2, 3), the focus is (-2, 5), and the directrix is y = 1.

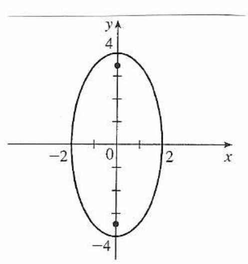


9. The equation has the form $y^2 = 4px$, where p<0. Since the parabola passes through (-1, 1), we have $1^2 = 4p(-1)$, so $4p = -1$ and the equation is $y^2 = -x$ or $x = -y^2$. $4p = -1$, so $p = -1/4$ and the focus is $(-1/4, 0)$, while the directrix is x = ¼.

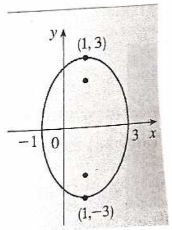
13.

$$4x^2 + y^2 = 16 \Rightarrow \frac{x^2}{4} + \frac{y^2}{16} = 1 \Rightarrow a = \sqrt{16} = 4, b = \sqrt{4} = 2, c = \sqrt{a^2 + b^2} = \sqrt{16-4} = 2\sqrt{3}$$

The ellipse is centered at (0, 0) with vertices at $(0, \pm 4)$. The foci are $(0, \pm 2\sqrt{3})$.

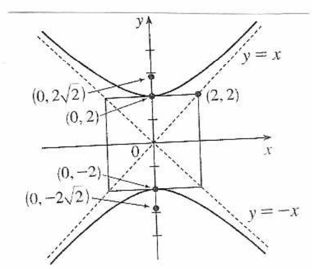


15. $9x^2 - 18x + 4y^2 = 27 \Leftrightarrow 9(x^2 - 2x + 1) + 4y^2 = 27 + 9 \Leftrightarrow 9(x-1)^2 + 4y^2 = 36$
$\Leftrightarrow \dfrac{(x-1)^2}{4} + \dfrac{y^2}{9} = 1 \Rightarrow a = 3, b = 2, c = \sqrt{5} \Rightarrow$ center (1, 0), vertices $(1, \pm 3)$, foci $(1, \pm\sqrt{5})$.

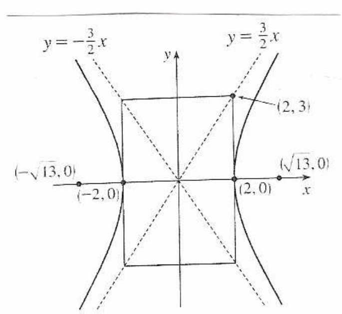


17. The center is (0, 0), a = -3, and b = 2, so an equation is $\dfrac{x^2}{4} + \dfrac{y^2}{9} = 1$.
$c = \sqrt{a^2 - b^2} = \sqrt{5}$, so the foci are $(0, \pm\sqrt{5})$.

21. $y^2 - x^2 = 4 \Leftrightarrow \dfrac{y^2}{4} - \dfrac{x^2}{4} = 1 \Leftrightarrow a = \sqrt{4} = 2 = b, c = \sqrt{4+4} = 2\sqrt{2} \Rightarrow$ center (0, 0), vertices $(0, \pm 2)$, foci $(0, \pm 2\sqrt{2})$, asymptotes $y = \pm x$.



22. $9x^2 - 4y^2 = 36 \Leftrightarrow \dfrac{x^2}{4} - \dfrac{y^2}{9} = 1 \Rightarrow a = \sqrt{4} = 2, b = \sqrt{9} = 3, c = \sqrt{4+9} = \sqrt{13} \Rightarrow$
center (0, 0), vertices $(\pm 2, 0)$, foci $(\pm\sqrt{13}, 0)$, asymptotes $y = \pm\dfrac{3}{2}x$.



27. $x^2 = 4y - 2y^2 \Leftrightarrow x^2 + 2y^2 - 4y = 0 \Leftrightarrow x^2 + 2(y^2 - 2y + 1) = 2 \Leftrightarrow$
$x^2 + 2(y-1)^2 = 2 \Leftrightarrow \dfrac{x^2}{2} + \dfrac{(y-1)^2}{1} = 1$. This is an equation for an ellipse with vertices at $(\pm\sqrt{2}, 1)$. The foci are at $(\pm\sqrt{2-1}, 1) = (\pm 1, 1)$.

29. $y^2 + 2y = 4x^2 + 3 \Leftrightarrow y^2 + 2y + 1 = 4x^2 + 4 \Leftrightarrow (y+1)^2 - 4x^2 = 4 \Leftrightarrow$
$\dfrac{(y+1)^2}{4} - x^2 = 1$. This is an equation of a hyperbola with vertices $(0, -1 \pm 2) = (0,1)$ and (0,-3). The foci are at $(0, -1 \pm \sqrt{4+1}) = (0, -1 \pm \sqrt{5})$.