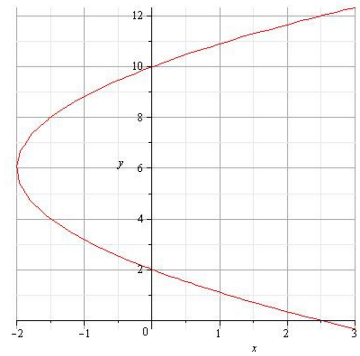
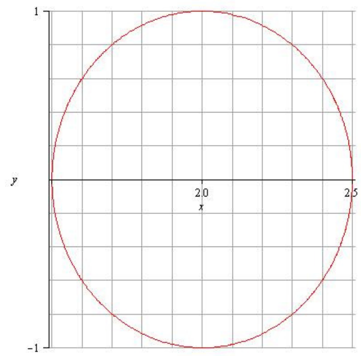
Math 142 Fall 2009 Practice Analytic Geometry Exam Answers

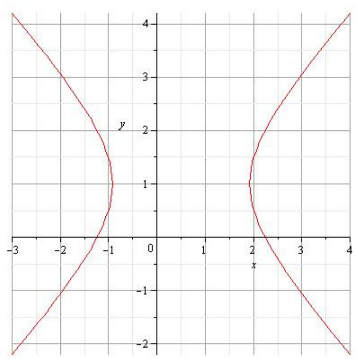
1. (a) equation in standard form: $(y-6)^2 = 8(x+2)$ (parabola)



(b) equation in standard form: $\dfrac{(x-2)^2}{\frac{1}{4}} + \dfrac{(y-0)^2}{1} = 1$ (ellipse)



(c) equation in standard form: $\dfrac{(x-\frac{1}{2})^2}{2} - \dfrac{(y-1)^2}{2} = 1$ (hyperbola)



2. (a) $\dfrac{y^2}{1} - \dfrac{x^2}{8} = 1$

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

(c) $(y-2)^2 = 8(x-2)$

3. (a) $(1, \frac{\pi}{2})$

(b) $(\sqrt{2}, \frac{5\pi}{4})$

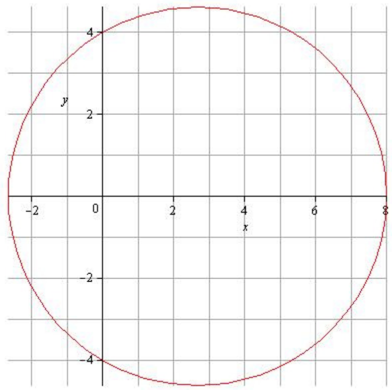
(c) $(2, \frac{\pi}{6})$

4. (a) $(-1, 0)$

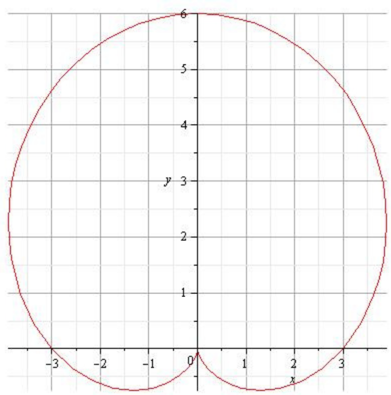
(b) $(0,3)$

(c) $(1,1)$

5. (a) $r = \dfrac{4}{1-\frac{1}{2}\cos\theta}$, $e = \frac{1}{2} < 1$ ellipse with one focus at the pole and directrix 8 units to the left of the pole, vertices (in polar coordinates) are at $(8,0)$ and $(\frac{8}{3},\pi)$. In rectangular coordinates, the vertices are $(8,0)$ and $(-\frac{8}{3},0)$. The center is the midpoint of the vertices: $(\frac{8}{3},0)$. To find the minor vertices, solve for b. We know that $c = \frac{8}{3}$ and $a = 8 - \frac{8}{3} = \frac{16}{3}$. Using $c^2 = a^2 - b^2$, we get $b = 8\frac{\sqrt{3}}{3} \approx 4.6$.



(b) cardioid



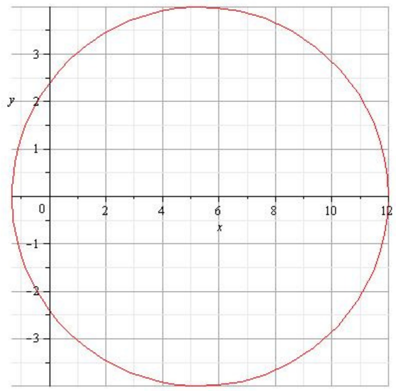
6. $z = \sqrt{8}\left(\cos\frac{7\pi}{4} + i\sin\frac{7\pi}{4}\right)$

7. $z = 3 + 0i$

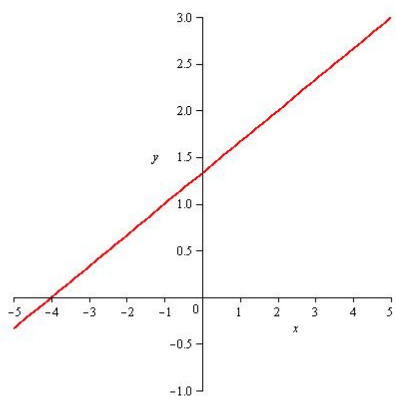
8. $3i,\ -\frac{3\sqrt{3}}{2} - \frac{3}{2}i,\ \frac{3\sqrt{3}}{2} - \frac{3}{2}i$

9. $512i$

10. polar equation is $r = \dfrac{12}{5 - 4\cos\theta}$, $e = \frac{4}{5} < 1$ ellipse with one focus at the pole and directrix 3 units to the left of the pole, vertices (in polar coordinates) are at $(12, 0)$ and $(\frac{4}{3}, \pi)$. In rectangular coordinates, the vertices are $(12, 0)$ and $(-\frac{4}{3}, 0)$. The center is the midpoint of the vertices: $(\frac{16}{3}, 0)$. To find the minor vertices, solve for b. We know that $c = \frac{16}{3}$ and $a = 12 - \frac{16}{3} = \frac{20}{3}$. Using $c^2 = a^2 - b^2$, we get $b = 4$.



11. $x = 3y - 4$ (graph is a line)



12. $\begin{cases} x = 2\cos t \\ y = 9\sin t \end{cases}$