

Review for the MA 154 Final
 Monday, December 15, 2003 1:00 – 3:00 p.m.

1. Find polar coordinates of the points with the following Cartesian coordinates.
 (a) $(-5, 0)$ (b) $(-5, -5)$

2. What are the Cartesian coordinates of the points with the following polar coordinates?
 (a) $(3, \pi/3)$ (b) $(\sqrt{2}, 3\pi/4)$

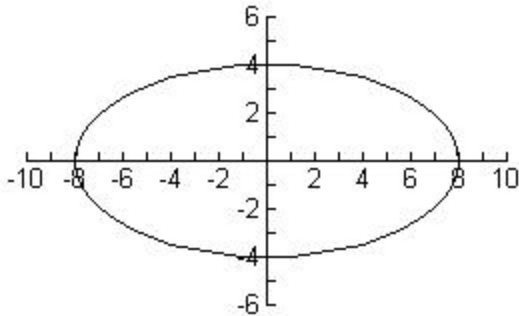
3. What are the parametric and Cartesian equations of the circle of radius 5 centered at the origin?

4. (a) Eliminate the parameter and write an explicit formula for the curve $x = e^{0.5t}$, $y = e^t$, $0 \leq t \leq 1$
 (b) Find the endpoints of the curve.

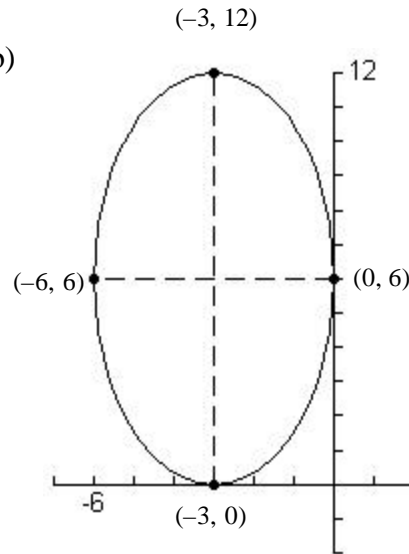
5. Write parametric equations for the quarter of an ellipse centered at $(0, 0)$, starting at $(0, 6)$ and ending at $(-3, 0)$.

6. Write implicit formulas for each of the conics graphed below.

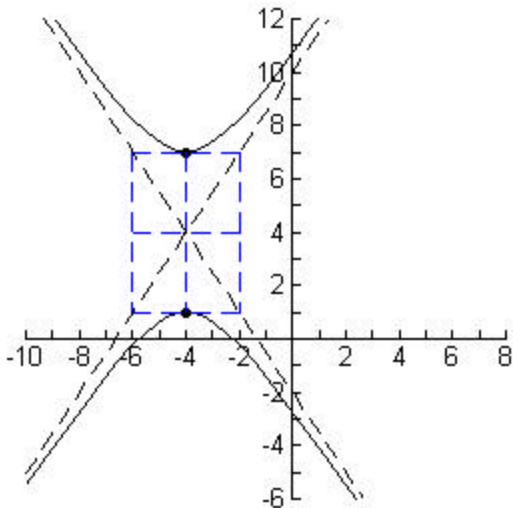
(a)



(b)



(c) center: $(-4, 4)$; vertices: $(-4, 1)$, $(-4, 7)$



7. Sketch a graph of each of the conics. Report the vertices.

a. $\frac{x^2}{4} + \frac{y^2}{16} = 1$

b. $\frac{(x-1)^2}{9} + \frac{(y+4)^2}{25} = 1$

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

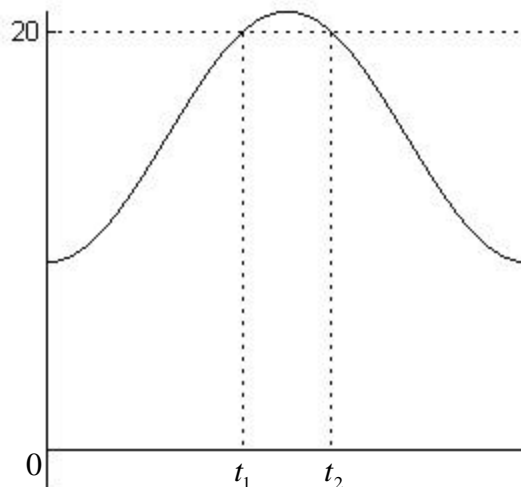
d. $\frac{(x+2)^2}{9} - \frac{(y-5)^2}{4} = 1$

8. For Question 8, a day is a 24 hour period beginning at midnight.

Two species of plant, A and B, propagate by dispersing their seeds in the wind during the height of summer. On a typical day in the height of summer, the wind speed, $w(t)$, measured in miles per hour t hours after midnight, is given by the

formula $w(t) = -6\cos\left(\frac{\pi t}{12}\right) + 15$.

(a) (5 pts.) Species A favors propagation in high winds and will only release its seeds if the wind speed is no less than twenty miles per hour. In the figure, the graph of $w(t)$ is given and the time interval over which species A will release its seeds is also indicated.

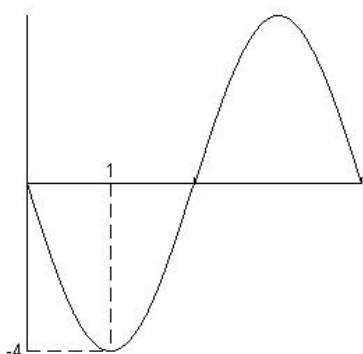


Complete the figure by calculating the values of the two endpoints of the interval.

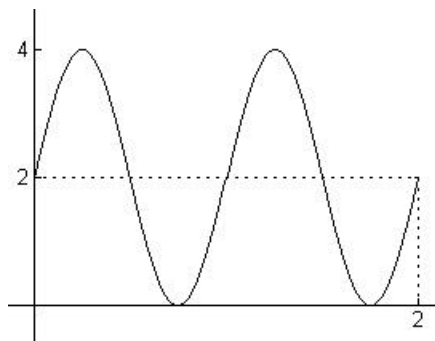
(b) (5 pts.) The seeds of species B are destroyed in high winds and hence species B has a seed release mechanism which only releases seeds if the wind speed is no greater than ten miles per hour. For how many hours, on a typical day in high summer, will species B be releasing seeds?

9. Find a possible formula for each:

a.



b.

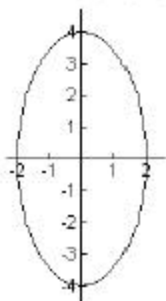


Answers to Review

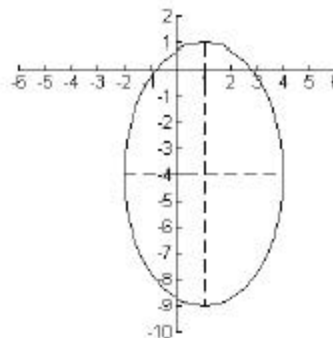
1. a. $r = 5$, $q = p$ b. $r = \sqrt{50}$, $q = \frac{5p}{4}$
2. a. $x = 3\cos(\frac{p}{3}) = \frac{3}{2}$ b. $x = \sqrt{2}\cos(\frac{3p}{4}) = (\sqrt{2})(-\frac{1}{\sqrt{2}}) = -1$
 $y = 3\sin(\frac{p}{3}) = \frac{3\sqrt{3}}{2}$ $y = \sqrt{2}\sin(\frac{3p}{4}) = (\sqrt{2})(\frac{1}{\sqrt{2}}) = 1$
3. Parametric equation: $x = 5\cos t$, $y = 5\sin t$ 4 a. $y = x^2$
 Cartesian equation: $x^2 + y^2 = 25$ b. $(1, 1)$ and (\sqrt{e}, e)
5. There are many possible answers. For example, $x = 3\cos t$, $y = 6\sin t$, $\frac{p}{2} \leq t \leq p$
 Another possible answer is $x = 3\cos(t + \frac{p}{2})$, $y = 6\sin(t + \frac{p}{2})$, $0 \leq t \leq \frac{p}{2}$

6. a. $\frac{x^2}{64} + \frac{y^2}{16} = 1$ b. $\frac{(x+3)^2}{9} + \frac{(y-6)^2}{36} = 1$ c. $\frac{(y-4)^2}{9} - \frac{(x+4)^2}{4} = 1$

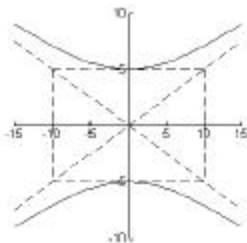
7. a. center: $(0, 0)$
 vertices: $(0, 4)$, $(0, -4)$



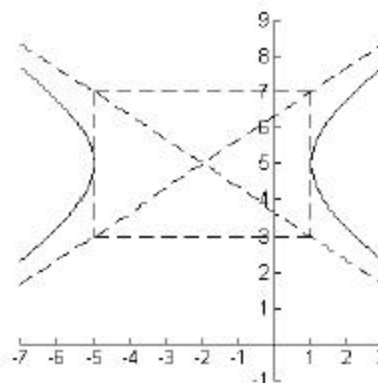
- b. center: $(1, -4)$
 vertices: $(1, 1)$, $(1, -9)$



- c. center: $(0, 0)$
 vertices: $(0, 5)$, $(0, -5)$



- d. center: $(-2, 5)$
 vertices: $(1, 5)$, $(-5, 5)$



8. a. $t_1 \approx 9.763$, $t_2 \approx 14.237$ (Solve graphically)
 b. 19.526 hours. Find where $w(t) = 10$; This is $t_1 \approx 2.237$ and $t_2 \approx 21.763$, so $t_2 - t_1 \approx 19.526$.
9. a. $y = -4\sin(\frac{\pi x}{2})$ b. $y = 2 + 2\sin(2\pi x)$

Additional Problems from Text (answers in back)

Section 6.2: 17, 21

Section 6.3: 13, 15, 23

Section 6.4: 15

Section 6.6: 1-13 odd

Section 6.7: 5, 7, 17, 23, 31

Chapter 6 Review: 29, 39, 41, 47

Section 7.1: 3, 7

Section 7.2: 23, 27

Section 7.3: 9, 25, 27

Section 7.4: 15

Section 7.6: 1, 3, 5

Chapter 7 Review: 9, 11

Section 8.2: 11, 53

Chapter 8 Review: 1, 5, 7, 43, 49, 51

Section 10.1: 5, 11

Section 10.2: 1, 7, 11, 13, 17

Section 10.3: 1

Section 10.4: 3

Chapter 10 Review: 11 (and show that the angle between any pair of vectors is 60°)

Section 11.1: 1, 7, 10

Section 11.2: 1-7 odd, 11,

Section 11.3: 5, 11, 25

Section 11.4: 1a, 2a, 3a, 9, 11, 13, 15, 21, 23

Section 11.5: 1-21 odd

Chapter 11 Review: 1-3, 5, 15, 17, 21, 23, 25