

Chapter Test Form A

1.  $\sin \theta = \frac{15}{17}$ ,  $\cos \theta = \frac{8}{17}$ ,  $\tan \theta = \frac{15}{8}$ ,  $\csc \theta = \frac{17}{15}$ ,

$\sec \theta = \frac{17}{8}$ ,  $\cot \theta = \frac{8}{15}$

2.  $\sec 2 \approx -2.40$

3. 16 inches

4.  $\alpha = 52^\circ$ ;  $a \approx 5.76$ ;  $c \approx 7.31$

5. B

6. Amplitude: 6; Period:  $\frac{2\pi}{3}$ ; Phase shift:  $\frac{\pi}{12}$ ; Vertical translation: 2

7. (a) No

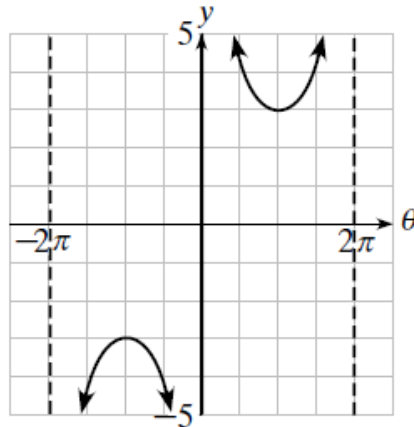
(b) Yes,  $3^{-x}$

(c) Yes,  $-4x$

(d) No

(e) Yes,  $0.35e^{-0.07x}$

8. The graph of  $y = 3 \csc \frac{1}{2}x$  can be obtained from the graph of  $y = \csc x$  by a vertical stretch of factor 3 and a horizontal stretch of factor 2. Period:  $4\pi$ ; Domain: all reals except  $x = 2\pi n$ ,  $n$  any integer; Range:  $(-\infty, -3] \cup [3, \infty)$ ; Zeros: none; Asymptotes:  $x = n2\pi$ ,  $n$  any integer



9.  $x \approx 3.50$  or  $x \approx 6.64$

10.  $a \approx 4.47$ ;  $b = 5.00$ ;  $h \approx 0.22$

11. B

12. 327.4 meters

13.  $\cos(\sin^{-1}u) = \sqrt{1-u^2}$ ; The  $\pm$  sign is unnecessary because the range of  $\sin^{-1}u$  is  $[-\frac{\pi}{2}, \frac{\pi}{2}]$  and

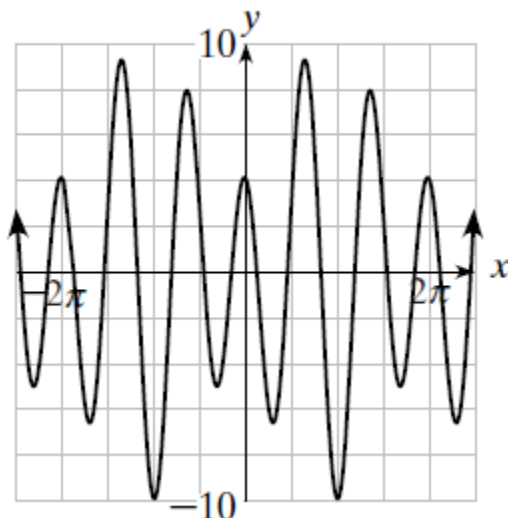
$\cos x \geq 0$  for  $x \in [-\frac{\pi}{2}, \frac{\pi}{2}]$ .

14. (a) \$80 million

(b) \$92.5 million

(c) 8 years

15. Period:  $2\pi$



## Chapter Test Form A

## Chapter 5

$$\begin{aligned} 1. \sec^2 x - \frac{\sec^2 x}{\csc^2 x} &= \frac{1}{\cos^2 x} - \frac{\frac{1}{\cos^2 x}}{\frac{1}{\sin^2 x}} = \frac{1 - \sin^2 x}{\cos^2 x} \\ &= \frac{\cos^2 x}{\cos^2 x} = 1. \end{aligned}$$

$$\begin{aligned} 2. (\tan x + 1)^2 &= \tan^2 x + 2 \tan x + 1 \\ &= (\tan^2 x + 1) + 2 \tan x \\ &= \sec^2 x + 2 \tan x \\ &= \frac{1}{\cos^2 x} + 2 \frac{\sin x}{\cos x} = \frac{1 + 2 \sin x \cos x}{\cos^2 x} \end{aligned}$$

$$3. x = \frac{\pi}{2} + 2\pi n, \text{ or } x = \frac{\pi}{4} + n\pi \text{ where } n \text{ is any integer}$$

$$4. \text{ No; any value of } x \text{ (except } \frac{\pi}{2} + n\pi, n \text{ an integer) counter example.}$$

$$5. \frac{\sqrt{6} - \sqrt{2}}{4}$$

$$\begin{aligned} 6. \cos 3x &= \cos x \cos 2x - \sin x \sin 2x \\ &= \cos x (\cos^2 x - \sin^2 x) - \sin x (2 \sin x \cos x) \\ &= \cos^3 x - 3 \sin^2 x \cos x \end{aligned}$$

$$7. \pm \sqrt{\frac{1 - \cos 6C}{2}}$$

$$8. \beta = 59.16^\circ$$

$$9. 0$$

$$10. \theta \approx 25.41^\circ \text{ or } \theta \approx 64.59^\circ$$

$$11. 52,440 \text{ square feet}$$

$$12. 12.2 \text{ meters}$$

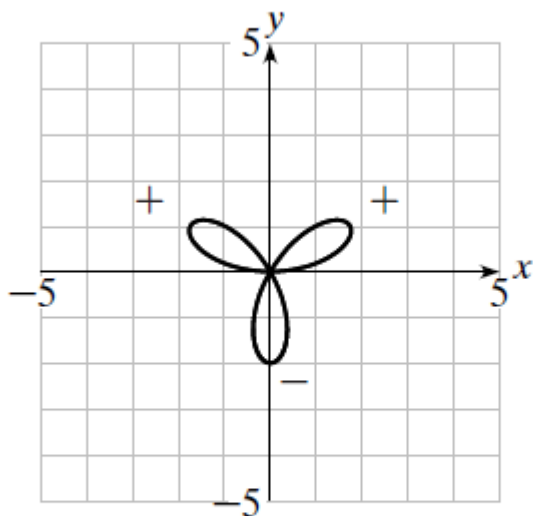
$$13. \text{ About } 646.7 \text{ ft}$$

$$14. 87.5 \text{ meters}$$

$$\begin{aligned} 15. A(\theta) &= 64 \cos \frac{\theta}{2} \sin \frac{\theta}{2} = 32 \sin \theta \\ \theta &\approx 51.38^\circ \text{ or } \theta \approx 128.62^\circ \end{aligned}$$

## Chapter Test Form A

- $-5i + j$
- $\langle -10, 19 \rangle$
- Ground speed  $\approx 437.90$  mph; Bearing  $\approx 261.78^\circ$  or  $8.22^\circ$  south of due west.
- $\langle 7/25, -24/25 \rangle = \langle 0.28, -0.96 \rangle$
- $\langle 2, -2 \rangle$
- $12(\cos 3\pi/4 + i \sin 3\pi/4)$
- $\langle 3, 3 \rangle$
- Approximately  $(6.55, -4.59)$
- $\frac{7}{4} + i\frac{7\sqrt{3}}{4}$
- parabola;  $y = 1 - x^2$
- (a)  $x(t) = (90 \cos 70^\circ) t$ ;  
 $y(t) = -16t^2 + (90 \sin 70^\circ)t$   
(b)  $0 \leq t \leq 5.29$   
(c)  $\approx 163$  ft
- A
- About 7.63 miles
- $0 \leq \theta \leq \pi$ ;



- $5(\cos \theta + i \sin \theta)$ , where  $\theta = 5\pi/12, 3\pi/4, 13\pi/12, 17\pi/12, 7\pi/4$
- $15,625i$

## Chapter Test Form A

- $(-1, -4), (2, -1)$
- $(1, 3)$
- $(-2.20, -7.81), (-0.41, -0.64), (1.11, 5.44)$
- B
- $(2, -3, 1)$
- $(3z + 2, 2z - 1, z)$ , where  $z$  is any real number
- D
- $\begin{bmatrix} 299 & 460 \\ 345 & 207 \end{bmatrix}$  is 1.15 times the original matrix.
- $$\begin{aligned} 2x + y &= 3 \\ -x + 3y + 4z &= 0 \\ -2y + z &= 5 \end{aligned}$$

10.  $(-13, 28, 23)$

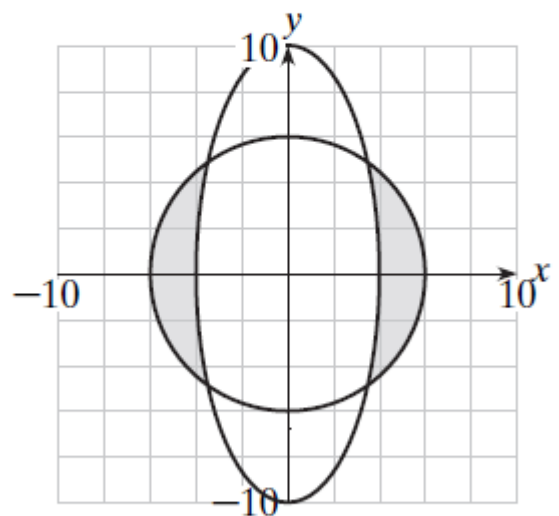
11. (a) 
$$\begin{aligned} x + y + z &= 40,000 \\ 6x + 8y + 10z &= 324,000 \\ 8y - 5z &= 0 \end{aligned}$$

(b) 
$$\begin{bmatrix} 1 & 1 & 1 \\ 6 & 8 & 10 \\ 0 & 8 & -5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 40,000 \\ 324,000 \\ 0 \end{bmatrix}$$

12. 
$$\begin{bmatrix} 1 & 0 & 0 \\ 22 & 1 & -5 \\ -4 & 0 & 1 \end{bmatrix}$$

13. 
$$\frac{3}{x+3} + \frac{2}{x-2}$$

14.



$$-6 \leq x \leq -3.4 \text{ and } 3.4 \leq x \leq 6$$

15.  $C = 21$  at  $(3, 6)$

## Chapter Test Form A

### Chapter 8

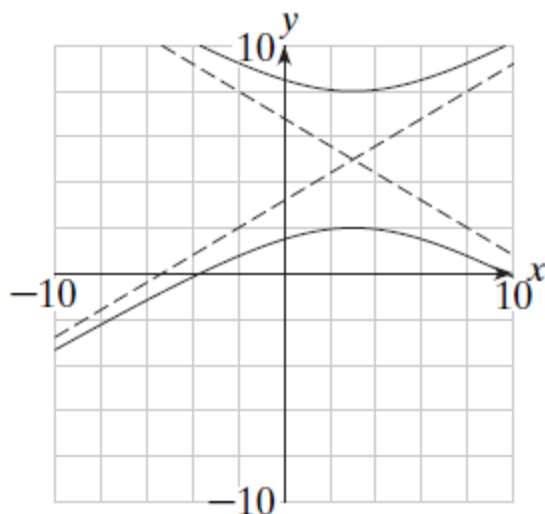
1. C

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

3. Center:  $(3, 5)$ ; Foci:  $(3, 5 \pm \sqrt{34})$ ;  
Endpoints:  $(3, 2), (3, 8)$ ;

Asymptotes:  $y = 5 \pm \frac{3}{5}(x - 3)$ .

4.



5.  $(3, 5)$

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

7.  $r = \frac{15}{4 - \sin \theta}$

8. 40 meters

9. Hyperbola:  $e = \frac{8}{5}$ ; Directrix:  $x = 3$

10. The antenna should be  $\frac{4}{3}$  feet from the vertex or  
16 inches.

11. Hyperbola

12.  $y = \frac{4 - x \pm \sqrt{25x^2 - 32x - 56}}{6}$

13.  $\frac{(x - 5)^2}{4} + (y + 2)^2 = 1$ ; ellipse

14.  $\sqrt{21}$

15.  $x = 2 + 3t$ ;  $y = -1 - 5t$ ;  $z = 3 + 3t$

16.  $(x - 1)^2 + (y - 5)^2 + (z + 4)^2 = 144$