Math 2312 – Pre-Calculus **_Exam 3_** **_Review_**

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1. Convert the angle to decimal degrees and round to the nearest hundredth of a degree.

a) $74° \; 8' \; 14''$ *b*) $34° \; 51' \; 35''$ *c*) $274° \; 18' \; 59''$

2. Convert the angle to degrees, minutes, and seconds.

a) $34.817°$ *b*) $59.0854°$ *c*) $89.9004°$

3. Convert to exact radians.

b) 215° *b*) $390°$ *c*) $144°$ *d*) $249.8°$

4. Convert to exact degrees

a) $\frac{17\pi}{12}$ *b*) $\frac{7\pi}{8}$ *c*) $\frac{9\pi}{4}$

5. If $\cos\theta = \frac{2}{3}$ and θ terminates in quadrant IV, find $\tan\theta$ and $\csc\theta$.

6. If $\csc\theta = -\frac{13}{5}$ and θ terminates in quadrant III, find $\cot\theta$

7. If $\sin\theta = \frac{12}{13}$ and θ terminates in QII, find each of the following:

a) $\cos\theta$ *b*) $\cot\theta$ *c*) $\csc\theta$

8. If the terminal ray of an angle θ contains $(4, \; -2)$, find the exact values of:

a) $\sin\theta$ *b*) $\sec\theta$ *c*) $\tan\theta$ *d*) $\cos^2\theta$

9. Find the lengths of the missing sides and angles for each triangle:

a) $B = 79.2^{\circ}, \; C = 35.1^{\circ}, \; a = 11.3$

b) $A = 120^{\circ}, \; a = 20, \; b = 40$

c) $A = 47^{\circ}, \; a = 80, \; b = 70$

d) $B = 47^{\circ}, \; a = 20, \; b = 18$

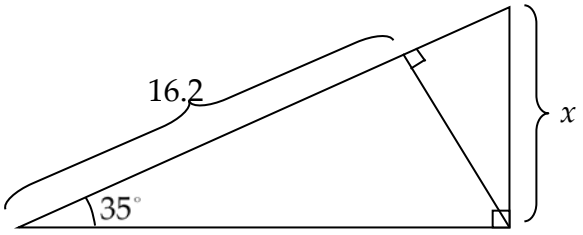
e) $A = 56^{\circ}, \; b = 20, \; c = 30$

f) $a = 20, \; b = 30, \; c = 11$

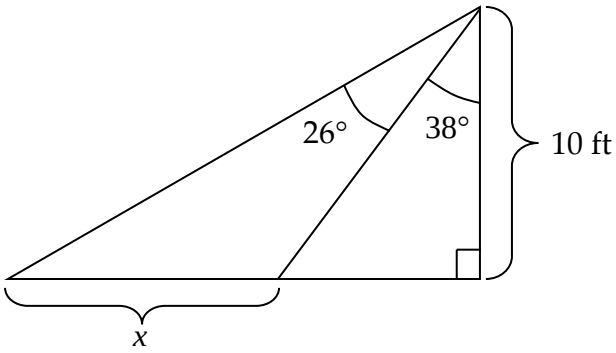
g) $B = 70^{\circ}, \; C = 10^{\circ}, \; a = 3$

h) $a = 8, \; b = 14, \; c = 15$

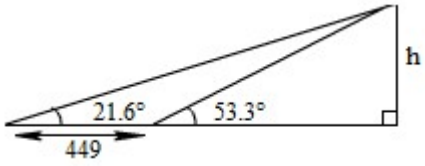
10. Find the value of *x* for the indicated figure



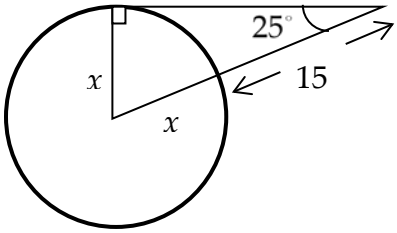
11. Find the value of *x* for the indicated figure



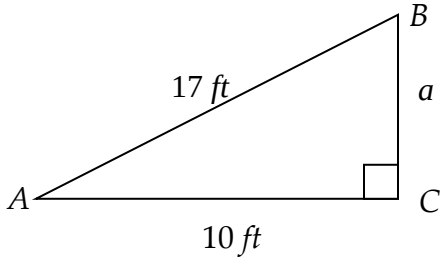
12. Find ***h*** as indicated in the figure.



13. Solve for *x* in the indicated figure:

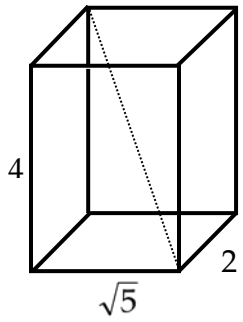


14. Find the missing sides and angles in the right triangle shown below:



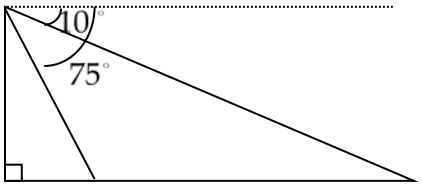
15. An 18 foot ladder is placed against a building so that its lower end is 3.5 feet from the base of the building. What angle does the ladder make with the ground?

16. Find the length of the diagonal of the rectangular box shown below:



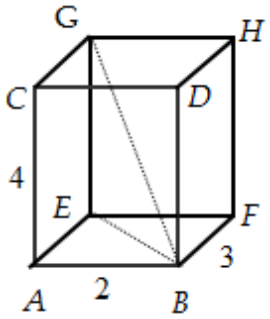
17. A ship travels for 25 miles at a bearing of S 13° E. It then changes direction and travels for 16 more miles at a bearing of N 77° E. Determine the ship's distance and bearing from its starting point.

18. From an airplane flying at 38,000 feet above the ground, a pilot sees two towns along a line directly below the path of the plane. The angles of depression to the towns are 10° and 75°. How many *miles* apart are the towns?



19. Consider the 3-dimensional figure shown below. Find each of the following:

a) the length of BE.
b) the length of BG.
c) the angle between BE and BG, rounded to the nearest tenth of a degree.



20. Find the amplitude, period, phase shift, and the vertical translation, and vertical asymptote, and then sketch the graph of the equation

a) $y = 2 - 4\cos\left(x + \frac{\pi}{6}\right)$

b) $y = -2\sin\left(x - \frac{2\pi}{3}\right)$

c) $y = -3\tan\left(2x + \frac{\pi}{3}\right)$

d) $y = 1 - 2\cot 2\left(x + \frac{\pi}{2}\right)$

e) $y = 2 + \frac{1}{4}\sec\left(\frac{1}{2}x - \pi\right)$

f) $y = \csc\left(2x - \frac{\pi}{4}\right)$

Solution

1. *a*) 74.137° *b*) 34.86° *c*) 274.32°

2. *a*) 34° 49′ 1.2″ *b*) 59° 5′ 7″ *c*) 89° 54′ 1″

3. *a*) $\frac{43\pi}{36}$ ***rad*** *b*) $\frac{13\pi}{6}$ ***rad*** *c*) $\frac{4\pi}{5}$ ***rad*** *d*) 4.36 ***rad***

4. *a*) 255° *b*) 157.5° *c*) 405°

5. $\tan\theta = -\frac{\sqrt{5}}{2}, \quad \csc\theta = -\frac{3}{\sqrt{5}}$

6. $\frac{12}{5}$

7. *a*) $-\frac{5}{13}$ *b*) $-\frac{5}{12}$ *c*) $\frac{13}{12}$

8. *a*) $-\frac{1}{\sqrt{5}}$ *b*) $\frac{\sqrt{5}}{2}$ *c*) $-\frac{1}{2}$ *d*) $\frac{4}{5}$

9. *a*) $A \approx 65.7^\circ,\ b \approx 12.2,\ c \approx 7.13$

b) no triangle possible

c) $B \approx 40^\circ,\ C \approx 93^\circ,\ c \approx 110$

d) Triangle # 1: $A \approx 54^\circ, C \approx 79^\circ, c \approx 24$; triangle #2: $A \approx 126^\circ, C \approx 7^\circ, c \approx 3.0$

e) $B \approx 41^\circ,\ C \approx 83^\circ,\ a \approx 25$

f) $A \approx 20^\circ,\ B \approx 149^\circ,\ C \approx 11^\circ$

g) $A \approx 100^\circ,\ b \approx 2.86,\ c \approx 0.53$

h) $A \approx 31.8^\circ,\ B \approx 67.2^\circ,\ C \approx 81^\circ$

10. 13.8

11. 12.7 ft

12. 252

13. 11.0

14. $A \approx 54.0^\circ,\ B \approx 36.0^\circ,\ a \approx 13.7$ ft

15. 78.8°

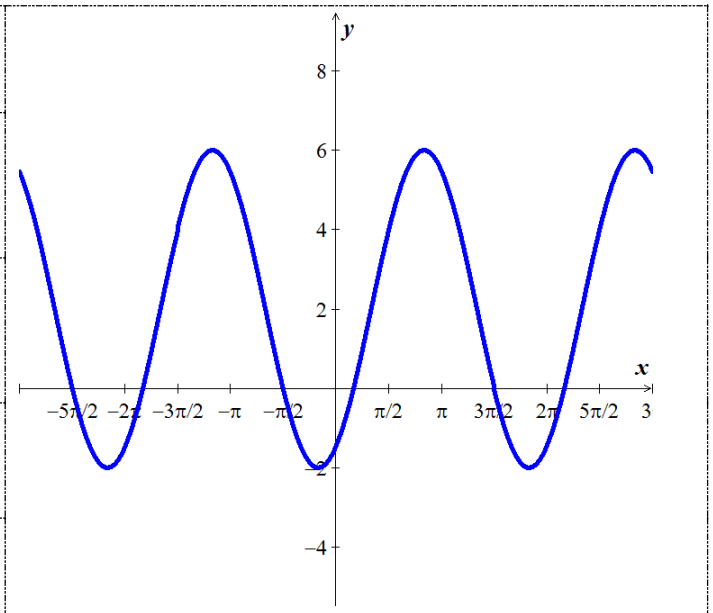
16. 5

17. dist: 29.7 mi bearing: S 45.6° E

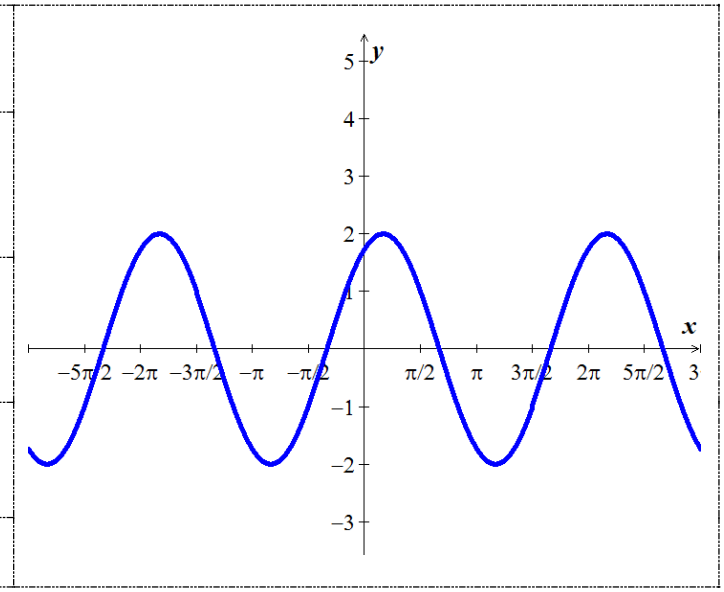
18. ≈ 38.9 mi

19. *a*) $\sqrt{13}$ *b*) $\sqrt{29}$ *c*) 48.0°

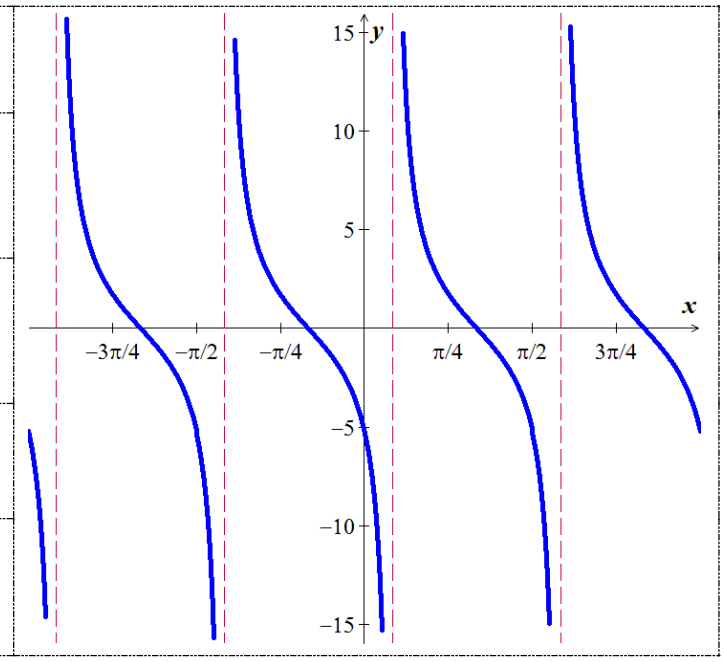
20. *a*) $y = 2 - 4\cos\left(x + \frac{\pi}{6}\right)$

$\boldsymbol{A} = 4$	
$P = 2\pi$	
$\phi = -\frac{\pi}{6}$	
Vertical translation: $y = 2$	
VA	

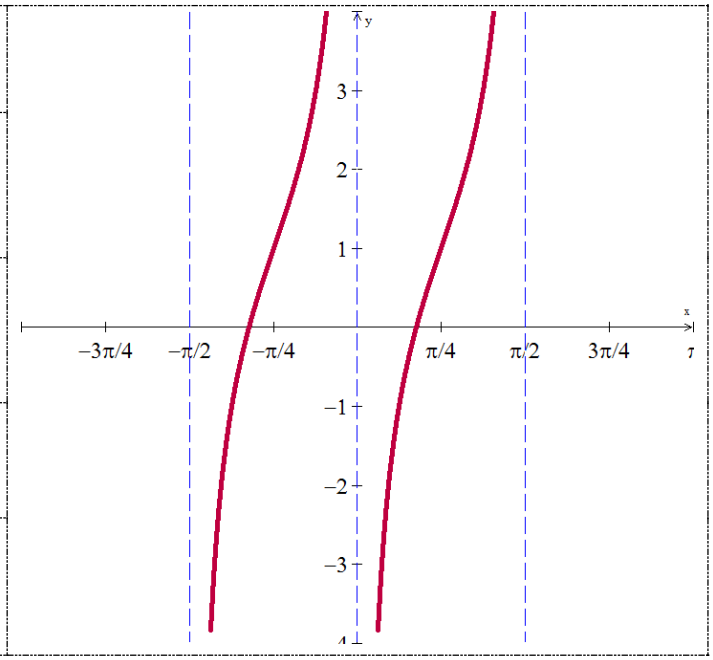
b) $y = -2\sin\left(x - \frac{2\pi}{3}\right)$

$\boldsymbol{A} = 2$	
$P = 2\pi$	
$\phi = \frac{2\pi}{3}$	
Vertical translation: $y = 0$	
VA	

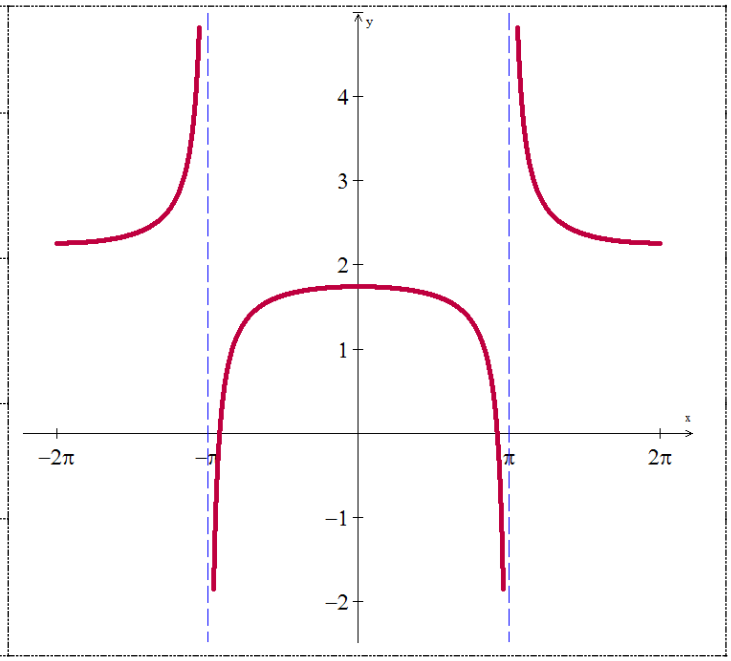
c) $y = -3\tan\left(2x + \frac{\pi}{3}\right)$

$\boldsymbol{A}$ = na	
$P = \frac{\pi}{2}$	
$\phi = -\frac{\pi}{6}$	
Vertical translation:	
VA: $x = n\frac{\pi}{2} + \frac{\pi}{12}$	

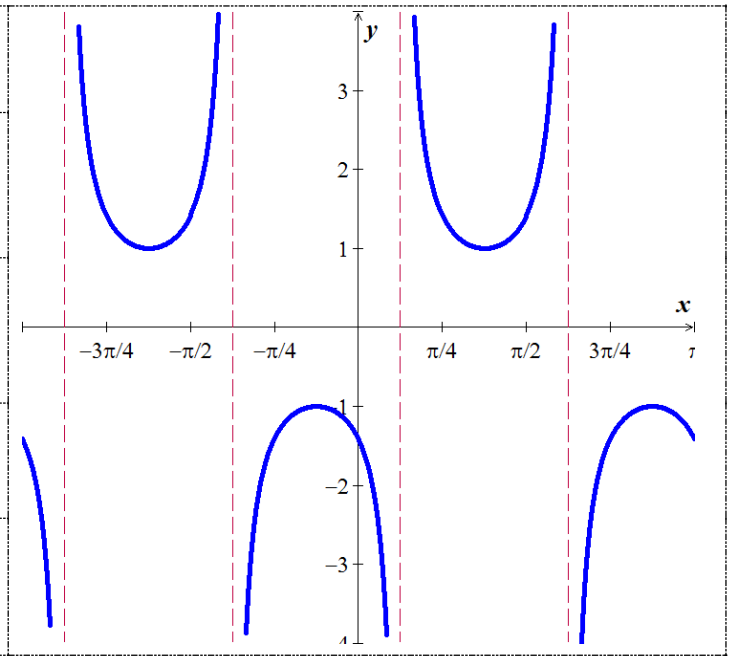
d) $y = 1 - 2\cot 2\left(x + \frac{\pi}{2}\right)$

$\boldsymbol{A}$ = na	
$P = \frac{\pi}{2}$	
$\phi = -\frac{\frac{\pi}{2}}{1} = -\frac{\pi}{2}$	
Vertical translation = 1	
VA: $x = -\frac{\pi}{2} + n\frac{\pi}{2}$	

e) $y = 2 + \frac{1}{4}\sec\left(\frac{1}{2}x - \pi\right)$

$\boldsymbol{A}$ = na	
$P = \frac{2\pi}{\frac{1}{2}} = 4\pi$	
$\phi = -\frac{-\pi}{\frac{1}{2}} = 2\pi$	
Vertical translation : $y = 2$	
VA: $x = 2n\pi + 3\pi$	

f) $y = \csc\left(2x - \frac{\pi}{4}\right)$

$\boldsymbol{A}$ = na	
$P = \frac{2\pi}{2} = \pi$	
$\phi = -\frac{\frac{\pi}{4}}{2} = -\frac{\pi}{8}$	
Vertical translation: $y = 0$	
VA: $x = n\frac{\pi}{2} + \frac{\pi}{8}$	