

MAT 1143 PRECALCULUS

EXAM 2 A

NAME \_\_\_\_\_

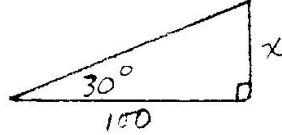
Chapter 6 (LHE)

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER.  
Explain your calculations and procedures for partial credit.  
TURN IN ALL WORKSHEETS. CALCULATORS ARE REQUIRED ON THIS TEST.

1. Find the six trigonometric functions of the angle  $\theta$  (in standard position) whose terminal side passes through the point  $(-5, 12)$ . Give exact form.
  
  
  
  
  
  
2. Given that  $\cos \theta = 3/8$  and  $\sin \theta < 0$ , sketch a right triangle and find the remaining five trigonometric functions in exact form.
  
  
  
  
  
  
3. Use the calculator to find two values of  $\theta$ ,  $0 \leq \theta \leq 2\pi$ , such that  $\tan \theta = -0.258$ . (Sketch!)

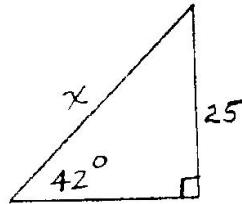
In 4 - 6, solve for  $x$ :

4.

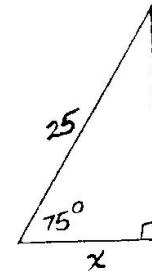


(Exact value!)

5.



6.



(Round answers to nearest thousandth.)

In 7 - 9, sketch the graph of the function (include two full periods).  
Label the graphs and describe the viewing rectangle.

7.  $f(x) = 2 \cos(2x + \pi)$  8.  $g(x) = 3 \csc(x/2)$  9.  $h(x) = 50 \sin 50x$

In 10 - 12, give information regarding amplitude, period, phase shift.

10.  $f(x) = 2 \cos(2x + \pi)$  11.  $g(x) = 2 \tan(2x - \pi)$  12.  $h(x) = \sec 50x$

a) Amplitude?

a) Period?

a) Period?

b) Period?

b) Phase Shift?

b) Phase Shift?

c) Phase Shift?

Find the exact value of each of the following by drawing an appropriate figure.

13.  $\tan(\arcsin -2/3)$

14.  $\sin(\arccos -2/3)$

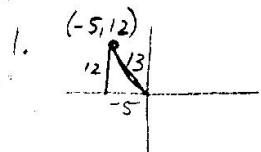
15.  $\sin(\arctan x/2)$

16.  $\tan(\arccos x/2)$

17. The angle from a point on the ground to the top of an eagle's nest is  $60^\circ$ . If the point on the ground is 35 meters from the base of the tree, how high is the nest?
18. The angle of depression from the top of a cliff to a ship at sea is  $38.6^\circ$ . If the cliff is 525 meters high, how far is the ship from the base of the cliff?
19. From a window 25 meters above the ground, the angle of elevation to the top of a tower is  $24^\circ$ , and the angle of depression to the bottom of the tower is  $14^\circ$ . Find the height of the tower.
20. From a point on the ground the angle of elevation to the top of a building is  $54^\circ$ . From the same point to a window 15 feet from the top of the building, the angle of elevation is  $42^\circ$ . How tall is the building?

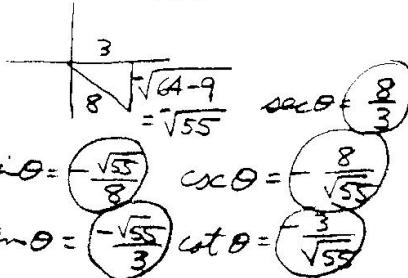
## MAT 1143 EXAM 2A SOLUTIONS

7



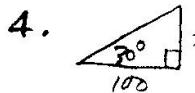
$$\begin{aligned}\sin \theta &= \frac{-12}{\sqrt{13}} \\ \cos \theta &= \frac{-5}{\sqrt{13}} \\ \tan \theta &= \frac{12}{5} \\ \sec \theta &= -\frac{\sqrt{13}}{5} \\ \csc \theta &= -\frac{\sqrt{13}}{12} \\ \cot \theta &= -\frac{5}{12}\end{aligned}$$

$$2. \cos \theta = \frac{3}{8} \quad \sin \theta < 0 \quad Q\text{IV}.$$

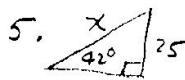


$$\begin{aligned}\sin \theta &= -\frac{\sqrt{55}}{8} \\ \cos \theta &= \frac{3}{\sqrt{55}} \\ \tan \theta &= -\frac{\sqrt{55}}{3} \\ \sec \theta &= \frac{8}{\sqrt{55}} \\ \csc \theta &= -\frac{8}{\sqrt{55}} \\ \cot \theta &= -\frac{3}{\sqrt{55}}\end{aligned}$$

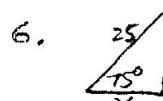
$$3. \tan \theta = -0.258 \\ \theta = -0.2525^R \quad Q\text{IV}. \\ -14.467^\circ$$



$$\begin{aligned}\tan 30^\circ &= \frac{x}{100} \\ x &= 100 \tan 30^\circ \\ &= 100 \frac{\sqrt{3}}{3} = \frac{100\sqrt{3}}{3} \\ &= 57.735\end{aligned}$$

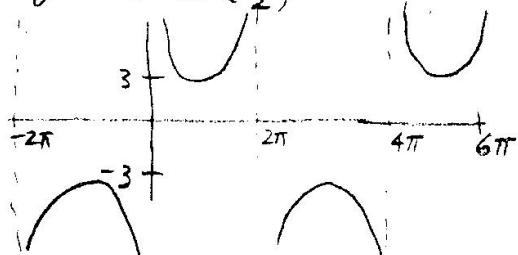


$$\begin{aligned}\sin 42^\circ &= \frac{25}{x} \\ x &= \frac{25}{\sin 42^\circ} \\ &= 37.362\end{aligned}$$



$$\begin{aligned}\cos 75^\circ &= \frac{x}{25} \\ x &= 25 \cos 75^\circ \\ &= 6.470\end{aligned}$$

$$8. g(x) = 3 \cos\left(\frac{x}{2}\right)$$



Zoom TRIG Asymp: 0, 2pi, 4pi, 6pi

$$11. g(x) = 2 \tan(2x - \pi)$$

$$\text{a) Period} = \frac{\pi}{2}$$

$$\text{b) P.S.} = 2x - \pi = 0 \\ x = \frac{\pi}{2} \text{ Right}$$

$$12. h(x) = \sec 50x$$

$$\text{a) Period} = \frac{2\pi}{50} = \frac{\pi}{25}$$

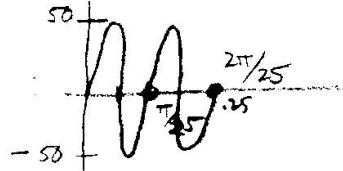
$$\text{b) P.S.} = 0$$

No Phase Shift

$$\text{Period} = \frac{2\pi}{50} = \frac{\pi}{25}$$

$$\text{Intercepts } 0, \frac{\pi}{50}, \frac{\pi}{25}, \frac{3\pi}{50}$$

$$9. k(x) = 50 \sin 50x$$



$$\text{Period} = \frac{2\pi}{50} = \frac{\pi}{25}$$

$$\text{Intercepts } 0, \frac{\pi}{50}, \frac{\pi}{25}, \frac{3\pi}{50}$$

$$10. f(x) = 2 \cos(2x + \pi)$$

$$\text{a) Amp} = 2$$

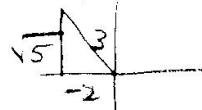
$$\text{b) Period} = \frac{2\pi}{2} = \pi$$

$$\text{c) P.S. } 2x + \pi = 0$$

$$\begin{aligned}x &= -\frac{\pi}{2} \\ &\text{Left}\end{aligned}$$

$$14. \sin \theta = 2 \quad Q\text{II}.$$

$$\sin \theta = \frac{\sqrt{5}}{3}$$



$$15. \sin \theta = 2 \quad Q\text{I or IV}.$$

$$\sin \theta = \frac{x}{\sqrt{x^2 + 4}}$$

$$13. \tan \left( \arcsin -\frac{2}{3} \right) \quad Q\text{IV}$$

$$\sin \theta = -\frac{2}{3}$$

$$\tan \theta = \frac{-2}{\sqrt{5}}$$

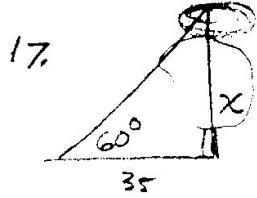
$$\text{Period} = \frac{\pi}{2}$$

$$\tan \theta = \frac{\sqrt{9-4}}{\sqrt{5}}$$

$$\tan \theta = \frac{\sqrt{5}}{2}$$

$$\tan \theta = \frac{\sqrt{4-x^2}}{x}$$

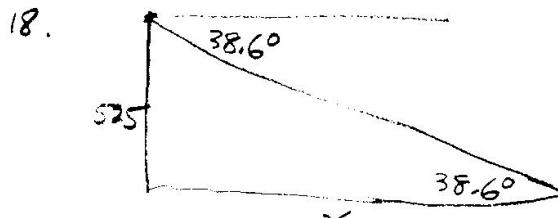
$$\tan \theta = \frac{\sqrt{4-x^2}}{x}$$



$$\tan 60^\circ = \frac{x}{35}$$

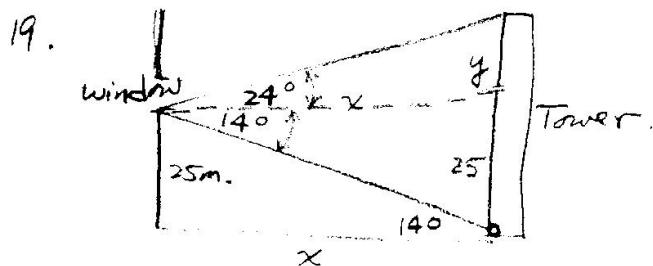
$$x = 35 \tan 60^\circ$$

$$= 35\sqrt{3} \text{ or } 60.62 \text{ m.}$$



$$\tan 38.6^\circ = \frac{525}{x}$$

$$x = \frac{525}{\tan 38.6^\circ} = 657.66 \text{ meters}$$



$$\tan 14^\circ = \frac{25}{x} \quad x = \frac{25}{\tan 14^\circ} \approx 100.270 \quad \tan 54^\circ = \frac{15+y}{u} \quad \tan 42^\circ = \frac{y}{u}$$

$$\tan 24^\circ = \frac{y}{x}$$

$$y = x \tan 24^\circ$$

$$= \frac{25 \tan 24^\circ}{\tan 14^\circ} = 44.64 \text{ m.}$$

+25

height  $\underline{\underline{+ 44.64 \text{ m.}}}$

20.  $\tan 54^\circ = \frac{15+y}{u} \quad \tan 42^\circ = \frac{y}{u}$

$$u = \frac{15+y}{\tan 54^\circ}$$

$$u = \frac{y}{\tan 42^\circ}$$

$$\frac{15+y}{\tan 54^\circ} = \frac{y}{\tan 42^\circ}$$

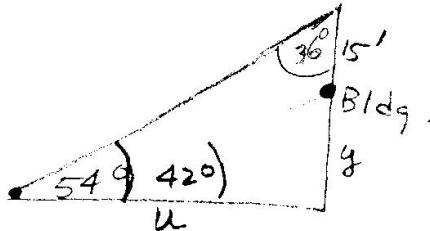
$$(15+y) \tan 42^\circ = y \tan 54^\circ$$

$$15 \tan 42^\circ + y \tan 42^\circ = y \tan 54^\circ$$

$$15 \tan 42^\circ = (\tan 54^\circ - \tan 42^\circ) y$$

$$y = \frac{(15 \tan 42^\circ)}{(\tan 54^\circ - \tan 42^\circ)} = \rightarrow$$

20.



Find y.

$$u = \frac{y}{\tan 42^\circ}$$

$$\tan 54^\circ = \frac{15+y}{y \tan 42^\circ}$$

Solve

$$f(y) = \frac{(15+y)}{\left(\frac{y}{\tan 42^\circ}\right)} - \tan 54^\circ$$

$$y = \frac{(15+x)(\tan 42^\circ)}{x} - \tan 54^\circ$$

Root:  $x = 28.375 \text{ ft.} = y$

$$\text{Bldg.} = 28.375 + 15' \\ = 43.375'$$