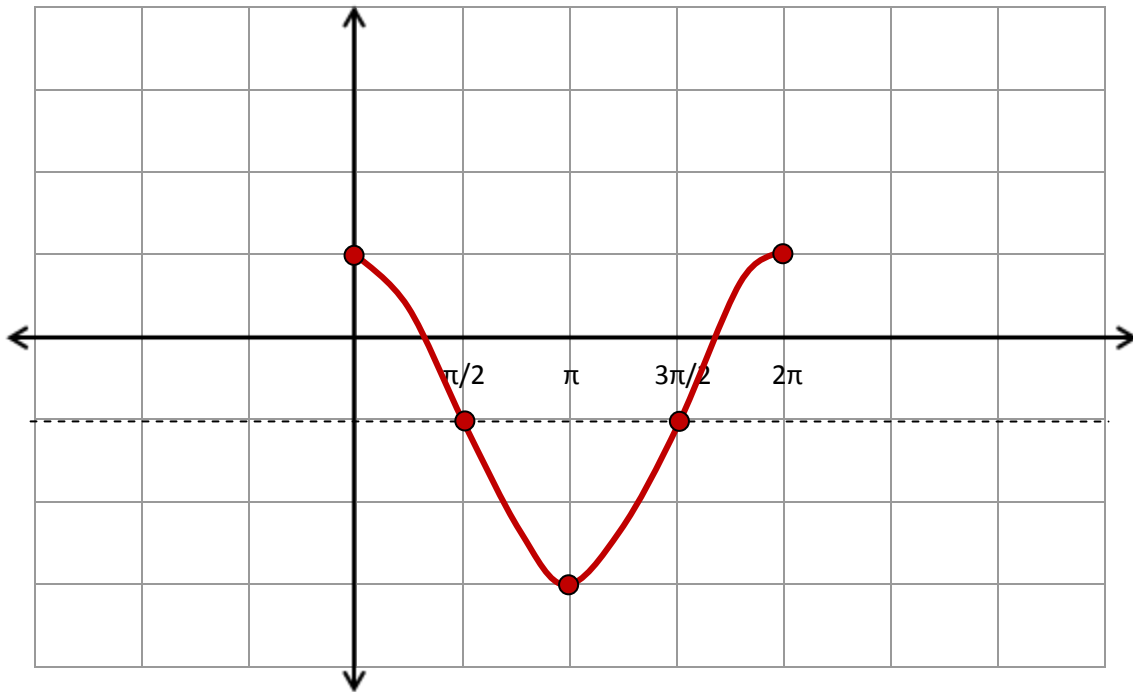


Name: _____

MTH113 Practice Test 1 (Chapter 4)

1. (5 pts.) Plot (and label) the graph of $y = 2 \cos(x) - 1$ over the interval $0 \leq x \leq 2\pi$



2. (6 pts.) Convert the following angles:

40° from degrees to radians (leave π in your answer if applicable)

$$40^\circ \left(\frac{\pi}{180} \right) = \frac{2\pi}{9}$$

$\frac{4\pi}{9}$ from radians to degrees

$$\frac{4\pi}{9} \left(\frac{180}{\pi} \right) = 80^\circ$$

3. (9 pts.) Find the reference angle θ' (positive acute angle) for each of the following angles (leave π in your answer if angle given in radians)

$$\theta = 210^\circ$$

$$210 - 180 = 30^\circ$$

$$\theta = 5\pi/6$$

$$\pi - 5\pi/6 = 6\pi/6 - 5\pi/6 = \pi/6$$

$$\theta = -230^\circ$$

$$360 - 230 = 130 \\ 180 - 130 = 50^\circ$$

4. (12 pts.) Find the exact value of the following functions (leave in any radical signs and simplify answer)

$$\sin\left(\frac{3\pi}{2}\right)$$

$$-1$$

$$\cos(180^\circ)$$

$$-1$$

$$\tan\left(\frac{\pi}{3}\right)$$

$$\sqrt{3}$$

5. (12 pts.) Find the exact value of the following functions (leave in any radical signs and simplify answer)

$$\sin\left(-\frac{\pi}{4}\right)$$

$$-\frac{1}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$$

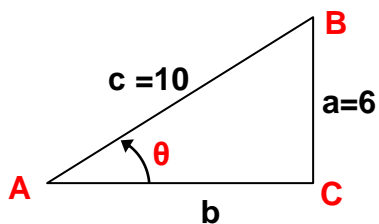
$$\cos(240^\circ)$$

$$-1/2$$

$$\csc\left(\frac{5\pi}{6}\right)$$

$$2$$

6. (12 pts.) Find the following for the given right triangle (leave in any radical signs and simplify answer)



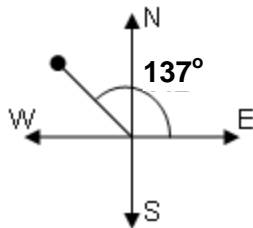
$$\sin \theta = \frac{6}{10} = \frac{3}{5}$$

$$\cos \theta = \frac{8}{10} = \frac{4}{5}$$

$$\tan \theta = \frac{6}{8} = \frac{3}{4}$$

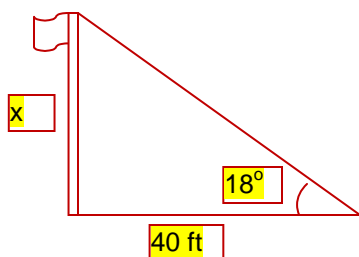
$$\begin{aligned} 6^2 + b^2 &= 10^2 \\ b^2 &= 100 - 36 \\ b &= 8 \end{aligned}$$

7. (4 pts.) A student who didn't pay attention as we discussed bearing the other day recently witnessed a crime on Sesame Street when Oscar the Grouch stole a bag of cookies from Elmo. The witness was unable to tell police the direction in which Oscar left after the crime but was able to sketch out the scene. What was Oscar's bearing as he left the scene of the crime based on the following drawing?



N47°W

8. (5 pts.) I understand that many of you are probably interested in putting a Virginia Tech flag in your yard in order to profess your newly found love for the Hokies. Suppose you want to erect a flag pole where the base of the pole is **40 feet** from the bottom your door and the top of the pole is at an angle of elevation of **18°** from the bottom of your door. How tall should the pole be (you should be able to sketch / solve a simple right triangle – include units and round to 2 decimal places)?



$$\tan(18^\circ) = x/40$$

$$x = 40\tan(18^\circ) = \mathbf{13.00 \text{ ft.}}$$

9. (6 pts.) Determine the amplitude and period of $y = -5 \sin(4x + 3)$

Amplitude = $|-5| = 5$

Period = $2\pi/4 = \pi/2$

10. (9 pts.) Use a calculator to find the value of the following (round to 2 decimal places)

$\tan(128^\circ) = -1.28$

$\cos(4\pi/9) = 0.17$

$\sin^{-1}(0.95) = 71.81^\circ$ or 1.25 rad

11. (8 pts.) Find the exact value of the following

$\sin^{-1}(\frac{1}{2}) = 30^\circ$ or $\pi/6$

$\cos^{-1}(-\frac{\sqrt{3}}{2}) = 150^\circ$ or $5\pi/6$

BONUS:

(+2 pts.) The Disneyland Ferris wheel has a radius of 75 feet. If the wheel rotated at 3 complete revolutions per minute, find the linear speed in feet per minute of a seat on this Ferris wheel (round to 2 decimal places).

$$s = r\theta = 75 \cdot (6\pi) = 450\pi$$

$$v = s/t = 450\pi/1 = 450\pi = 1413.72 \text{ ft/min}$$

(+2 pts.) Given that $\sin(x) = \frac{\sqrt{3}}{2}$ and $0 \leq x \leq \frac{\pi}{2}$, find the exact value of $\cos(x)$ using a trig identity

$$\sin^2(x) + \cos^2(x) = 1$$

$$3/4 + \cos^2(x) = 1$$

$$\cos^2(x) = 1/4$$

$$\cos(x) = 1/2$$

() ????

Possibly useful formulas...

$$\theta = s/r$$

$$v = s/t$$

$$y = A \sin(Bx - C) + D$$

$$\text{amplitude} = |A|$$

$$\text{period} = 2\pi/B$$