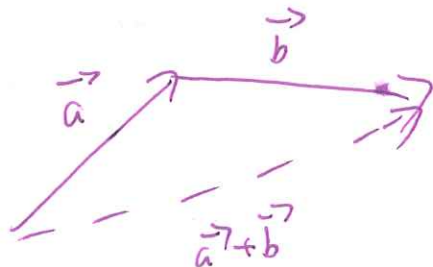


Name: Answer Key

### Math 1316: Mastery Quiz 5 (Version A)

Please show all your work for computations, and write your final answers in the boxes.

1. Draw a picture to illustrate the definition of the sum of two vectors.



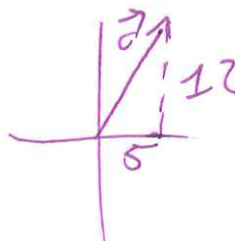
2. Suppose you know two vectors in  $\langle x, y \rangle$ -components:  $\vec{a} = \langle -3, 4 \rangle$  and  $\vec{b} = \langle -2, -2 \rangle$ . Calculate  $\vec{a} + \vec{b}$ .

$\vec{a} + \vec{b} =$   
 $\langle -5, 2 \rangle$

$$\begin{aligned}\vec{a} + \vec{b} &= \langle -3-2, 4-2 \rangle \\ &= \langle -5, 2 \rangle\end{aligned}$$

3. Suppose you know a vector in  $\langle x, y \rangle$ -components:  $\vec{c} = \langle 5, 12 \rangle$ . Find the magnitude of  $\vec{c}$ . [Hint: Draw  $\vec{c}$  starting from the origin.]

magnitude of  $\vec{c}$   
 $13$



$$\begin{aligned}\text{Mag: } r^2 &= 5^2 + 12^2 \\ &= 25 + 144 \\ r^2 &= 169 \\ r &= \sqrt{169} \\ &= 13\end{aligned}$$

4. A plane flies directly north at 420 miles per hour. The wind is blowing directly west at 60 miles per hour. Determine the angle the plane's trajectory is off from north and the overall speed of the plane. Give the angle in degrees, rounded to two digits past the decimal point, and the speed in miles per hour, rounded to the nearest whole number. [Hint: Draw a picture of the vectors!]

angle off from true north

$$8.13^\circ$$

overall speed

$$424 \text{ mph}$$

$$s^2 = 60^2 + 420^2$$
$$= 180,000$$

$$s \approx 424.26$$

$$\tan \alpha = \frac{60}{420} = \frac{1}{7}$$

$$\alpha = \tan^{-1}\left(\frac{1}{7}\right)$$

$$\approx 8.13^\circ$$

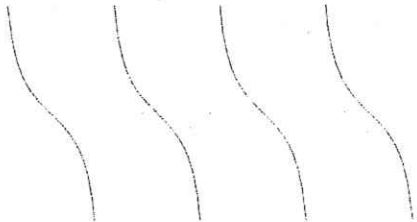


Name: Answer Key

Math 1316: Mastery Quiz 6 (Version A)

Please show all your work for computations, and write your final answers in the boxes.

1. These six graphs each give a graph of a basic trig function. Identify the trig function giving each graph.



$\cot x$



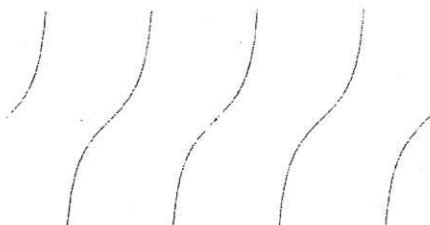
$\sec x$  or  $\csc x$



$\sin x$  or  $\cos x$



$\cos x$  or  $\sin x$



$\tan x$



$\sec x$  or  $\csc x$



The problem asks for the answer so either answer is acceptable.

2. A wave is modeled by the equation  $y(t) = 2 \sin(\frac{1}{2}(t - \pi/2))$ . Determine the period, amplitude, maximum, minimum, vertical shift, and horizontal shift of the wave.

period  
 $4\pi$

amplitude  
 $2$

$$\text{period} = \frac{2\pi}{1/2} = 4\pi$$

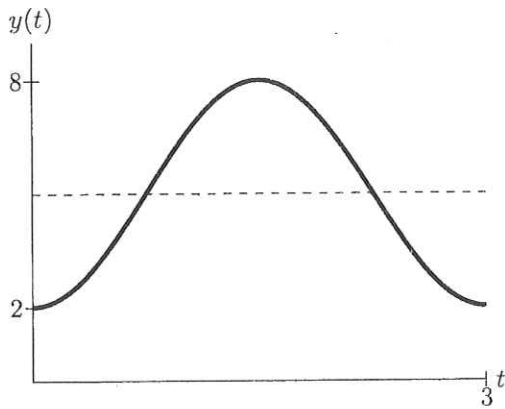
maximum  
 $+2$

minimum  
 $-2$

vertical shift  
 $0$

horizontal shift  
 $+\pi/2$

3. A weight on a spring bounces up and down, from a minimum height of 2 inches above the ground to a maximum height of 8 inches above the ground. At time  $t = 0$  seconds the weight is at its minimum height, and it takes 3 seconds for it to make a complete cycle and return to its original position, as in the graph. Write an equation which describes the height  $y(t)$ , in inches, of the weight above the ground as a function of time  $t$ , in seconds.



start at bottom so  
 $-\cos$ , no H.S.

$$\text{V.S.} = \frac{8+2}{2} = \frac{10}{2} = 5$$

$$\text{Ampl} = \frac{8-2}{2} = \frac{6}{2} = 3$$

$$B = \frac{2\pi}{\text{period}} = \frac{2\pi}{3}$$

$$y(t) = -3 \cos\left(\frac{2\pi}{3}t\right) + 5$$