



2.5.3 Practice: Trigonometric Functions

Practice Assignment

Precalculus Sem 2 (S3518797)

Blake Burns

Points possible: 50

Date: _____

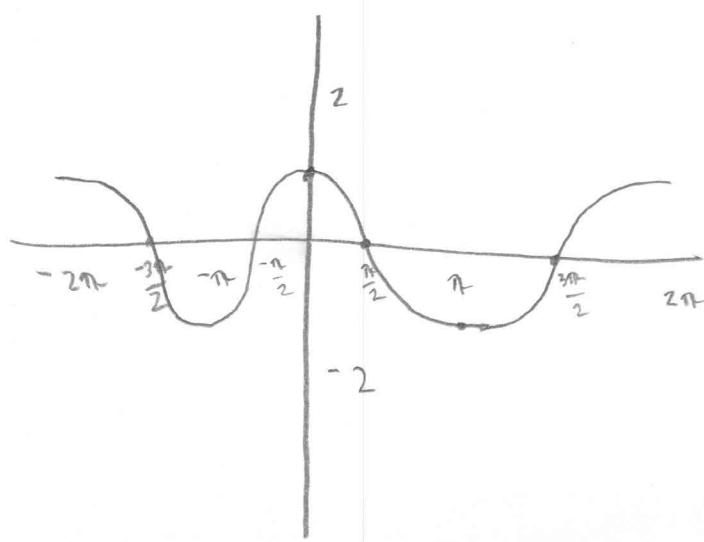
Answer the following questions using what you've learned from this unit. Write your responses in the space provided.

1. You (safely) bungee jump from a 200-feet tall bridge in your town. Your distance above the water's surface depends on the time since you jumped. Sketch a reasonable graph. (3 points)

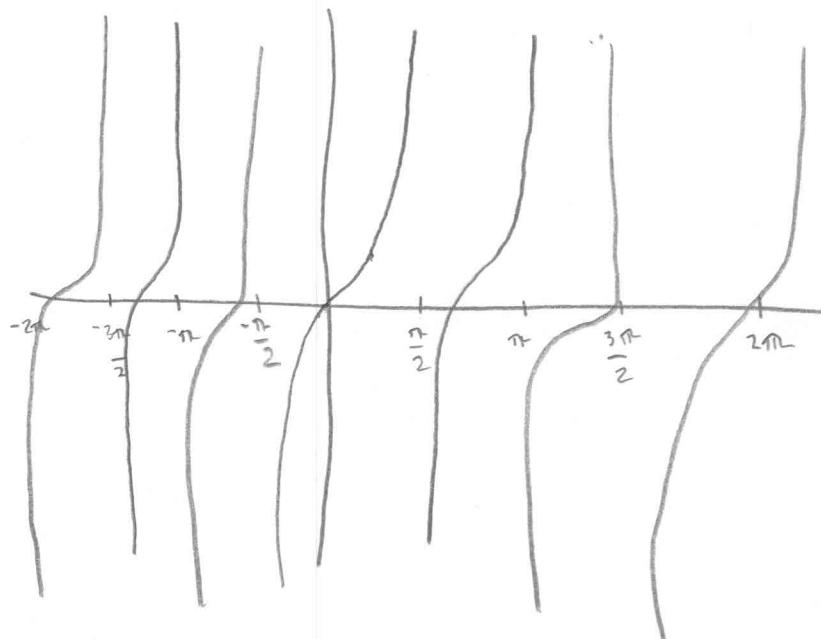


For questions 2 - 5, sketch the graph of each function, showing two complete cycles between $[-2\pi, 2\pi]$. Label the x-coordinates of any zeros or asymptotes. (3 points each)

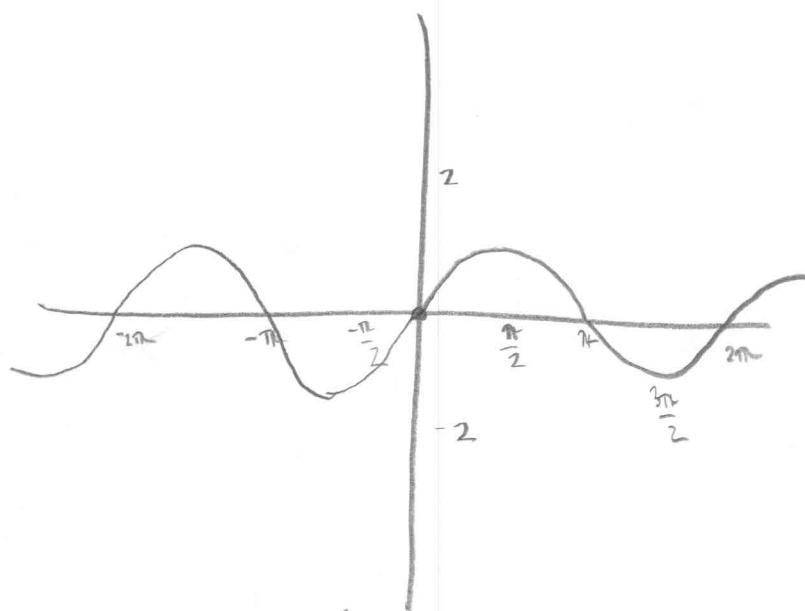
2. $y = \cos x$



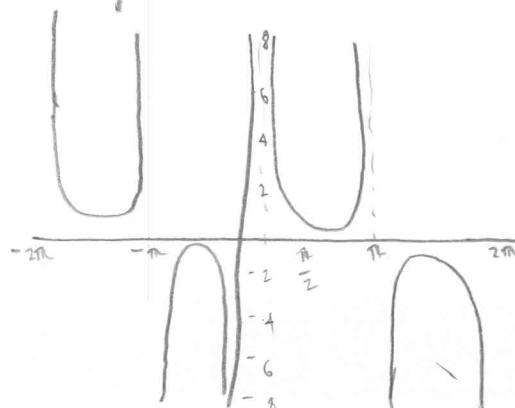
3. $y = \tan x$



4. $y = \sin x$



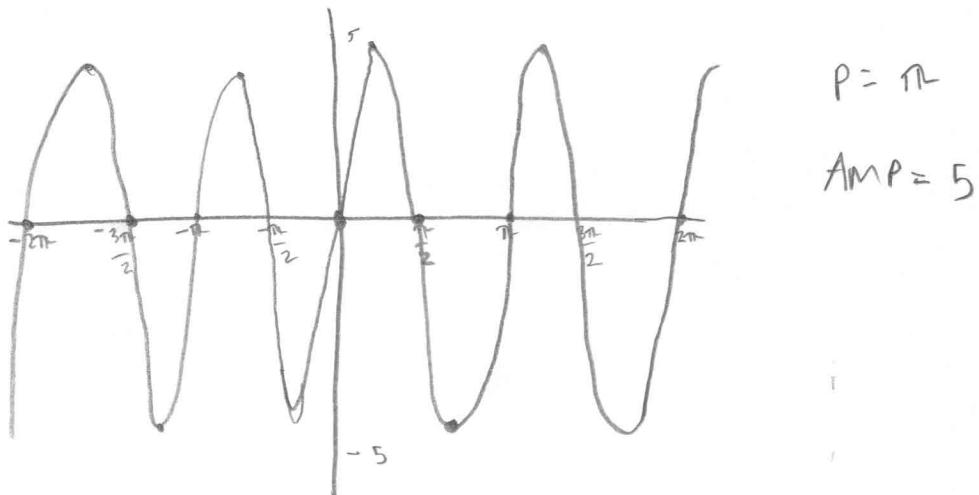
5. $y = \csc x$



For questions 6 - 8, sketch two complete cycles of the graph, then answer the questions about the function:

- What is the period? (2 points)
- What is the amplitude? (2 points)
- How is the graph related to its parent graph $y = \sin x$ or $y = \cos x$? (2 points)

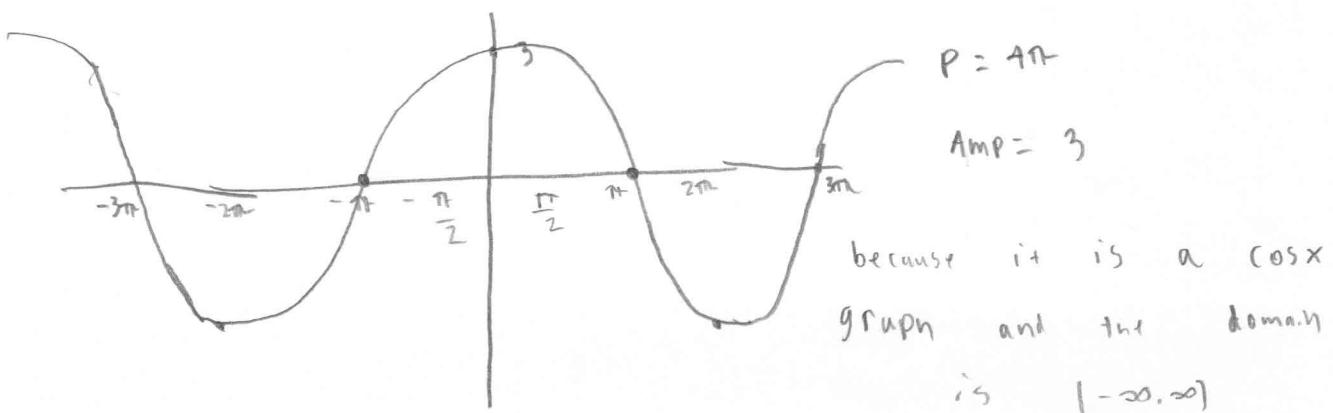
6. $y = 5 \sin 2x$



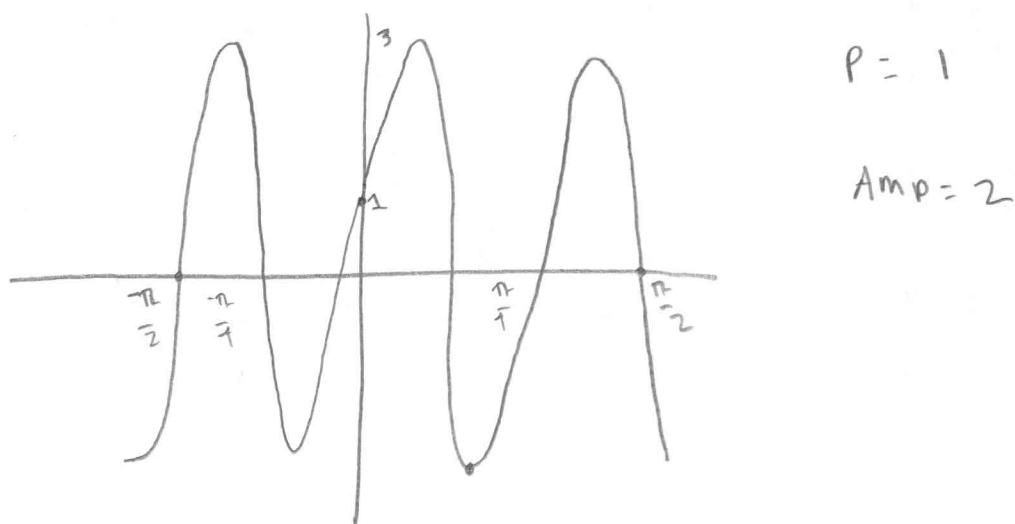
because it is a $y = \sin x$ graph

and it has a Domain of $(-\infty, \infty)$

7. $y = 3 \cos\left(\frac{x}{2}\right)$



8. $y = 2 \sin(2\pi x) + 1$



9. Which pair of functions has identical graphs? (2 points)

(a) $y = \sin\left(x + \frac{\pi}{2}\right)$

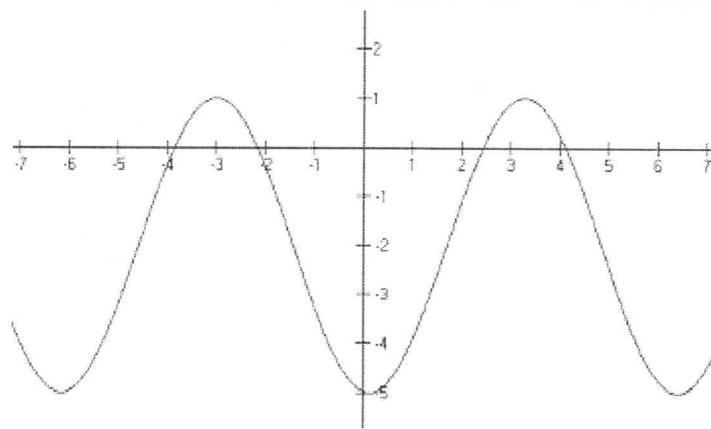
(b) $y = -\cos(x - \pi)$

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

A and B are identical

10. Write the particular equation of this transformed cosine graph. (Hint: Try to find the best point to center the sinusoidal axis.) (3 points)

$$y = 3 \cos(x - \pi) - 2$$



11. Write the particular equation of this transformed sine graph. Assume that the horizontal shift is 1 unit to the right. (Hint: Try to find the best point to center the sinusoidal axis.) (3 points)

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

12. Write the equation of the transformed graph of tangent with period 4 that has been shifted vertically up 3 units. (3 points)

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

13. Write the equation of the transformed graph of sine with period π that has been shifted vertically up 3 units and has an amplitude of $\frac{3}{4}$. (3 points)

$$y = 3 + \frac{3}{4} \sin 2x$$

14. Write the equation of the transformed graph of sine with period π that has been shifted horizontally to the right 3 units, has an amplitude of $\frac{3}{4}$, and has been flipped across the x-axis. (3 points)

$$y = -\frac{3}{4} \sin(2x-3)$$



2.5.6 Test (TS): Trigonometric Functions

Test

Precalculus Sem 2 (S3518797)

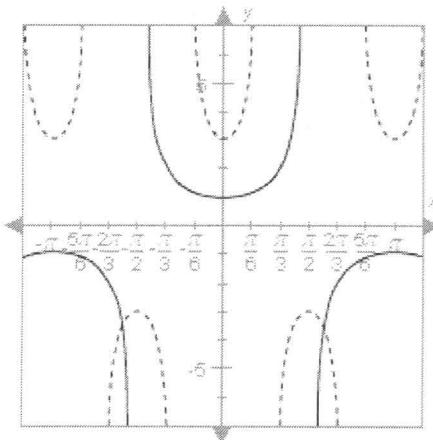
Blake Burns

Points possible: 100

Date: _____

Answer the following questions using what you've learned from this unit. Write your responses in the space provided.

- Graphs of two trigonometric functions are shown below.



Part I: What is the period of the solid graph? (2 points)

$$P = 2\pi$$

Part II: What is the period of the dotted graph? (2 points)

$$P = \pi$$

Part III: The solid graph is the graph of one of the six main trigonometric functions. Which of the six is it? How do you know this? (4 points)

Secant \Rightarrow reciprocal of cosines

Part IV: The dotted graph is a transformation of the solid graph. It shows a vertical stretch and a horizontal stretch. What is the vertical stretch factor of the dotted graph? (2 points)

Vertical Stretch : 3

Horizontal n : $\frac{1}{2}$

Part V: Take your answers to Part II and Part III and apply the transformation from Part IV to generate the function that produces the dotted graph. **(4 points)**

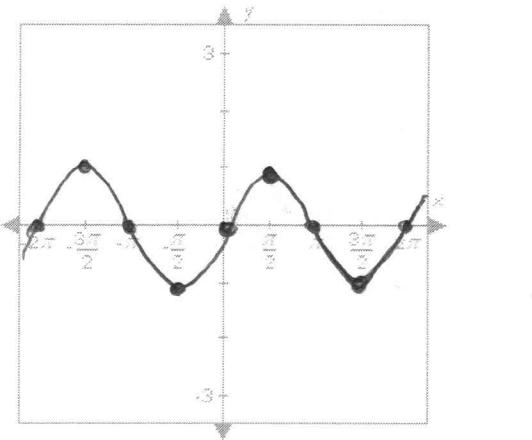
$$y = 3 \sec(2x)$$

Part VI: The function that produces the solid graph is the reciprocal function for another trigonometric function. Use the y -intercept of the solid graph to identify this reciprocal function. **(2 points)**

$$y = \sec(x)$$

2. Consider the function $y = \sin x$ and answer the questions that follow.

Part I: Graph two periods of the function $y = \sin x$. Be sure to identify (with a dot that is larger than the line of the graph) at least three critical points in the graph. **(10 points)**



Part II: Describe how the graph of the function $y = 1.5 \sin(4x)$ is related to the graph of $y = \sin x$.

A. What is the amplitude of the function $y = 1.5 \sin(4x)$? **(2 points)**

$$\text{Amp} = 1.5$$

B. What is the period of the function $y = 1.5 \sin(4x)$? **(2 points)**

$$P = \pi/2$$

- C. Compare the amplitude of $y = 1.5 \sin(4x)$ to the amplitude of $y = \sin x$. (2 points)

The amp of $y = \sin x$ is 1

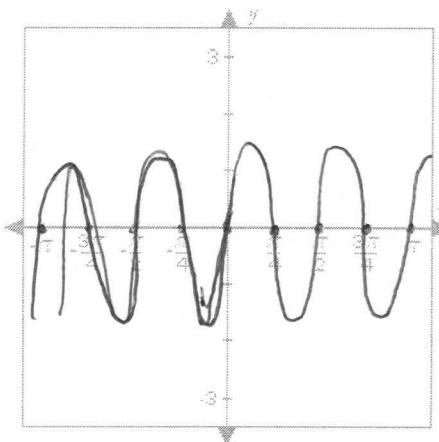
while $y = 1.5 \sin(4x)$ is 1.5

- D. Compare the period of $y = 1.5 \sin(4x)$ to the period of $y = \sin x$. (2 points)

The period for $y = \sin x$ is 2π

while $y = 1.5 \sin(4x)$ is $\frac{\pi}{2}$

- Part III:** Graph two periods of the function $y = 1.5 \sin(4x)$. (6 points)



3. Consider the two functions below:

$$F(x) = 2 \cos(\pi x)$$

$$G(x) = \frac{1}{2} \cos(2x)$$

- Part I:** What are the amplitudes of the two functions? (4 points)

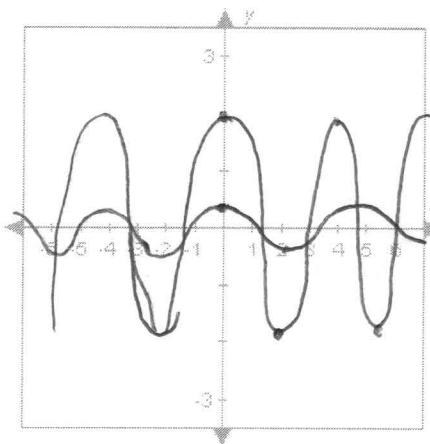
$$g(x) = A = \frac{1}{2} \quad f(x) = A = 2$$

Part II: What are the periods of the two functions? (4 points)

$$g(x) = p = \pi$$

$$f(x) = p = 2$$

Part III: Draw sketches of at least two periods of the two graphs, labeling each of the graphs. You may have to approximate the critical points of one of the graphs. (8 points)



For the functions below, state the amplitude, period, phase shift, and vertical translation of the graph for the sinusoid. (8 points for each question)

4. $H(x) = -3 \sin\left(x - \frac{\pi}{4}\right) + 2$

With respect to the parent function $F(x) = \sin(x)$:

Part I: What is the amplitude of the function $H(x)$? (2 points)

$$\text{Amp} = 3$$

Part II: What is the period of the function $H(x)$? (2 points)

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

Part III: What is the phase shift of the function $H(x)$? (2 points)

$\frac{\pi}{3}$ to the right

Part IV: What is the vertical translation of the function $H(x)$? (2 points)

Vertical shift : 2

5. $G(x) = 2 \cos \left[2\pi \left(x + \frac{2\pi}{3} \right) \right] - 5$

With respect to the parent function $F(x) = \cos(x)$

Part I: What is the amplitude of the function $G(x)$? (2 points)

Amp = 2

Part II: What is the period of the function $G(x)$? (2 points)

P = 1

Part III: What is the phase shift of the function $G(x)$? (2 points)

$\frac{2\pi}{3}$ to the left or $-\frac{2\pi}{3}$

Part IV: What is the vertical translation of the function $G(x)$? (2 points)

Vertical shift: -5

6. Explain how the graph of $R(x) = -3 \tan \left(\frac{1}{2}x \right)$ is related to the graph of the basic trigonometric function $F(x) = \tan x$.

Part I: What kind of reflection does the basic function experience? (2 points)

Vertically flipped

Part II: What is the vertical stretch factor of the function $R(x)$? **(2 points)**

$$\text{---} - 3$$

Part III: What is the horizontal stretch factor of the function $R(x)$? **(4 points)**

$$\frac{1}{2}$$

Part IV: What is the period of the function $R(x)$? **(4 points)**

$$P = 2\pi$$

Use your answers to Parts I through IV to graph the function $R(x) = -3 \tan\left(\frac{1}{2}x\right)$.

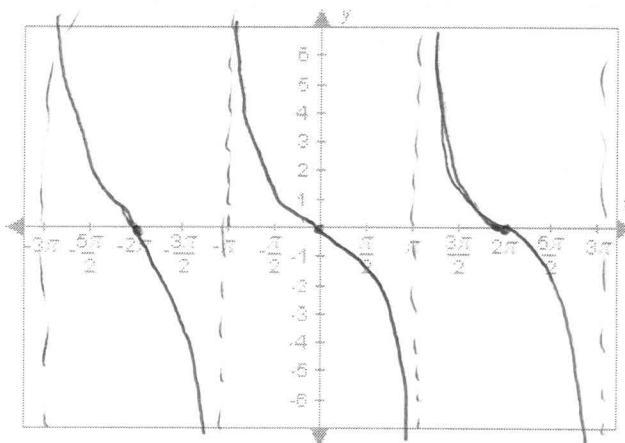
Part V: What are the equations of the vertical asymptotes of this function? **(4 points)**

$$x = 2\pi n$$

Part VI: What are the zeros of this function? **(4 points)**

$$x = \pm \pi n$$

Part VII: Sketch the graph of the function $y = -3 \tan\left(\frac{1}{2}x\right)$. **(8 points)**



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