

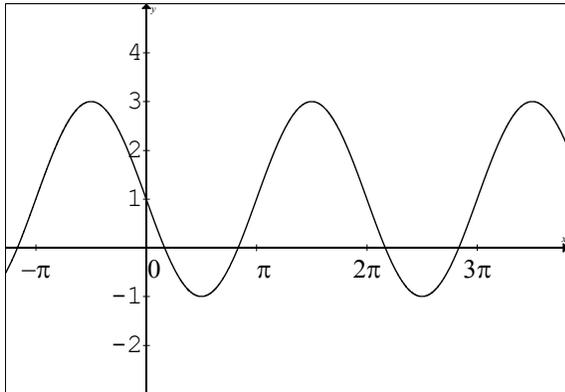
MATH 1813: Review, Exam 3 Quizzes, Spring 2020

On all problems, show your work or explain your reasoning.

Exam 3 Quiz, Part 1: Sections 7.4 and 7.5

Section 7.4: Sine and Cosine Graphs

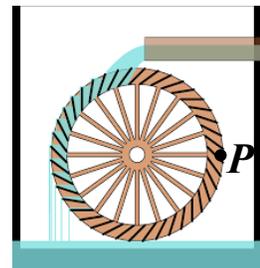
1. Determine the amplitude, period, midline, and whether the graph has an x -axis reflection and/or a vertical shift. Then, write a possible equation for the graph.



Amplitude: _____
 x -axis reflection? *yes/no* (circle one)
 Period: _____
 Midline: $y =$ _____
 Vertical shift: _____ units *up/down* (circle one)
 Equation: _____

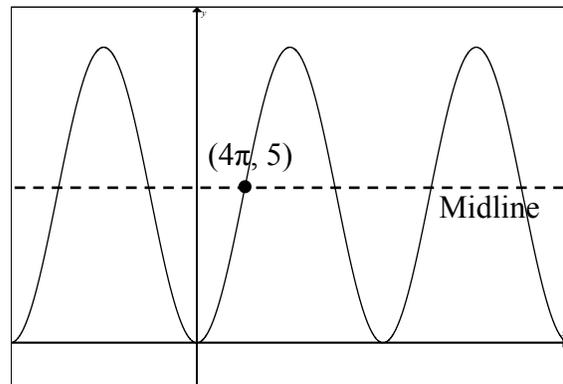
2. For the function $f(x) = -4.2\sin(x) + 1.1$, find the amplitude and midline. In addition, find the domain and range (in interval notation) of f .

3. A mill has a water wheel that has a radius of 13 ft and the bottom of the wheel is 1 ft above the surface of the water. The wheel rotates counterclockwise, starting at the 3 o'clock position. Let h be the height (in feet) of the point P above the water as a function of the angle of θ radians. Find a formula for $h(\theta)$, and sketch a graph for $0 \leq \theta \leq 2\pi$.



Section 7.5: Sinusoidal Functions

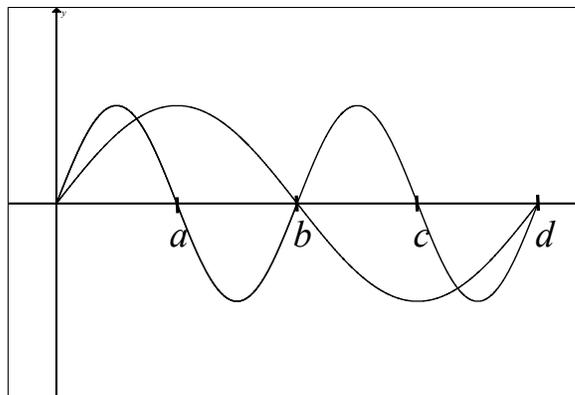
4. Find a possible formula for the trigonometric function shown at right.



5. A population of animals oscillates between a low of 1300 on January 1 ($t = 0$) and a high of 2200 on July 1 ($t = 6$).

Assume the population can be modeled by a sinusoidal function. Find a formula for the population P in terms of the time t in months.

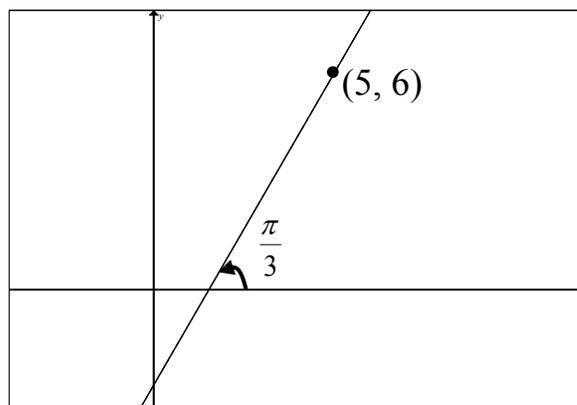
6. The graphs below show
 $f(x) = \sin(4\pi x)$ and $g(x) = \sin(2\pi x)$.
 Identify which graph is f and which is g , and
 identify the values of a , b , c , and d .



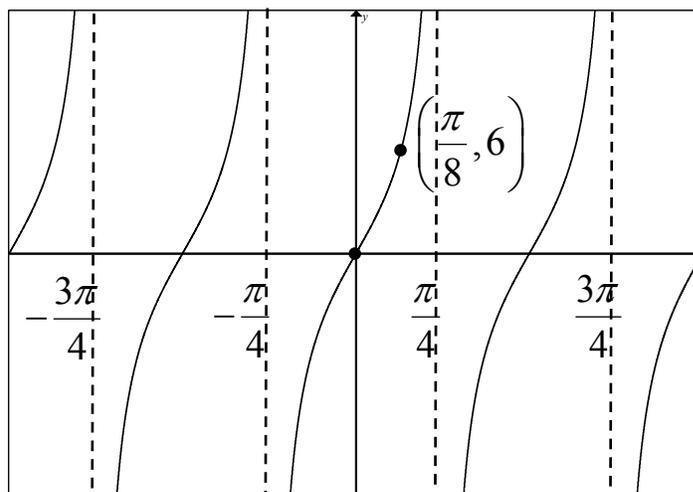
Exam 3 Quiz, Part 2: Sections 7.6 to 7.8

Section 7.6: Tangent

7. Find the equation of the line that
 intersects the x -axis at an angle of $\frac{\pi}{3}$
 radians and passes through the point $(5, 6)$.
 Give *exact values* for the slope m and the y -
 intercept b , along with the equation of the
 line. Then, give the equation of the line with
 parameters *rounded to 2 decimals*.



8. Given the tangent function that
 passes through the points $(0, 0)$ and
 $\left(\frac{\pi}{8}, 6\right)$, and with asymptotes as shown
 in the figure, first **describe** in words
 how this graph is related to the graph of
 $y = \tan x$. Then, find a **possible**
formula of the form
 $f(t) = A \tan(Bt) + C$.



9. Sketch the graph of a transformed tangent function with vertical asymptotes at every odd integer ($\dots, x = -3, x = -1, x = 1, x = 3, \dots$) and passing through the points $(0, 1)$ and $(0.5, -3)$. Use your graph to find a possible formula of the form $f(t) = A \tan(Bt) + C$.

Section 7.7: Other Trig Functions, Identities

10. Simplify the expression (for values of the variable for which it is defined). Remember to show each of your steps in a clearly shown order. *Write your final answer in simplest terms, using a single trigonometric function (if possible).*

(a) $\tan \theta \csc \theta$

(b) $(\cos x + \sin x)^2 - 2 \cos x \sin x$

11. Given an expression for $\sin \theta$, find expressions for $\cos \theta$ and $\tan \theta$, with θ in the first quadrant. Your answers will be algebraic expressions in terms of x .

$x = 4 \sin \theta$

12. Use *identities* to find the **exact values** of each of the following, given that

$\tan \theta = \frac{5}{2}$ and $\pi \leq \theta \leq \frac{3\pi}{2}$.

(a) $\cos \theta$

(b) $\sin \theta$

(c) $\sec \theta$

13. (a) If $\cos t = \frac{a}{b}$, where $0 < a < b$, what is the exact value of $\cos(-t)$?

(b) If $\sin t = \frac{c}{d}$, where $0 < c < d$, what is the exact value of $\sin(-t)$?

Section 7.8: Inverse Trig Functions

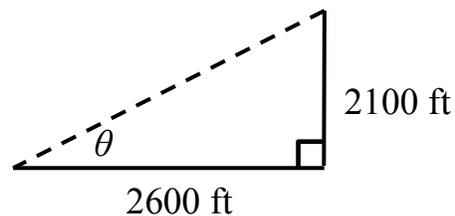
14. Evaluate each of the following. *Give exact answers.*

(a) $\cos^{-1}(0)$

(b) $(\sin 45^\circ)^{-1}$

(c) $\cos \left[\left(\frac{6}{\pi} \right)^{-1} \right]$

15. If a ski slope has the measurements as shown below, what is its angle of elevation, in degrees? *Round your answer to the nearest tenth of a degree.*



16. For the equation $n = \sin^{-1} m$, which letter represents the angle?

17. Find the angle θ , in radians, in the second quadrant whose tangent is -4.5 . *Round to 2 decimals.*

18. Solve the equation for a value of θ in the first quadrant. Give your answer in radians and degrees. *Round radian angles to 3 decimals and round degree angles to 1 decimal.*

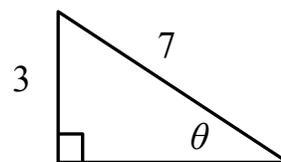
$$8\cos\theta - 5 = 0$$

19. Solve the equation for $0 \leq t \leq 2\pi$: $5\tan t + 4 = 6\tan t + 5$. Give **exact** answers.

Exam 3 Quiz, Part 3: Sections 8.1 and 9.1

Section 8.1: Right Triangle Trigonometry

20. For the given triangle, find the exact values of $\sin\theta$, $\cos\theta$, and $\tan\theta$.

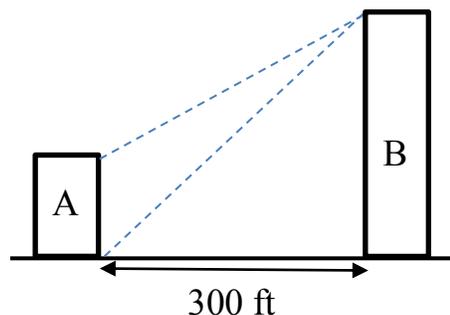


21. A line passing through the origin and point $P = (a, 10)$ forms the angle 26° with the x -axis. Find the missing coordinate of P . *Round to 1 decimal.*

22. For $\tan\theta = 28$, find θ , an angle in a right triangle. Give your answer in degrees, *rounded to 2 decimals.*

23. Given $a = 10$ and $c = 12$, find the missing side and angles (in degrees) in the right triangle, where a is the side across from angle A , b across from B , and c across from the right angle. *Round to 1 decimal.*

24. The angle of elevation from the bottom of building A to the top of building B is 48° . When standing on the roof of building A, the angle of elevation to building B is 32° . If the two buildings are 300 feet apart, how tall is building A? *Round to the nearest foot.*



Section 9.1: Trig Equations

25. Find approximate solutions to $\cos\theta = -0.43$ on the interval $-2\pi \leq \theta \leq 2\pi$. *Round to 2 decimals.*

26. Find the exact solutions to $5(\sin \theta - 1) = 3\sin \theta - 7$ on the interval $0 \leq \theta < 2\pi$.

27. Find all exact solutions to $\cos \theta = \frac{1}{4\cos \theta}$.

28. In a particular week, the water temperatures in a lake rise and fall in a 24-hour cycle, so they can be modeled by a sinusoidal function. The minimum temperature was 45°F , which occurs each day at 4 AM. The maximum temperature was 55°F , which occurs at 4 PM each day. When is the temperature of the lake 50°F ?