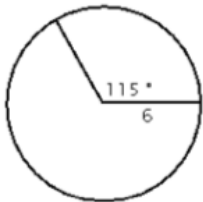


Exam #1 Review Guide (Chapters 5 & 6)

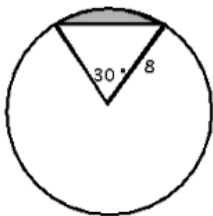
The first exam will cover Sections 5.1-5.4 & 6.1-6.2. The problems on this review guide are representative of the type of problems worked on homework and during class time. Do not just depend on this guide for studying for the exam. When you have trouble with a particular problem type, you should go back to the text, homework, and class notes to find additional problems to practice. For the problem types you are comfortable with, you should still practice some more, in addition to this guide. The answers to the following problems are attached. ***Make sure you are in the habit of showing all your work; you will need to do so on the exam to receive credit.***

Chapter 5

1. Use your calculator to compute $\sin(4.367)$ and $\sec(5.189)$.
2. Convert 72° into radians.
3. Convert $\frac{3\pi}{5}$ rad into degrees.
4. Determine the area of a circular sector of radius 16 in with a central angle of 85° . Express your answer in square inches.
5. For the circle shown below, determine the length of an arc subtended by a central angle of 115° .



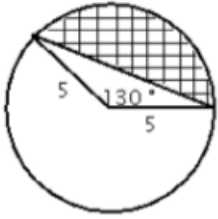
6. Determine the area of the shaded segment shown below. Give both the exact form of the answer as well as a decimal approximation that is accurate to two decimal places.



7. In $\triangle ABC$ with $\angle C = 90^\circ$, suppose $AC = 5$ and $BC = 8$. Calculate $\cos A$. Give both the exact form of the answer as well as a decimal form that is accurate to three decimal places.
8. In $\triangle ABC$ with $\angle C = 90^\circ$, suppose $AC = 4$ and $AB = 9$. Calculate $\csc A$. Give both the exact form of the answer as well as a decimal form that is accurate to three decimal places.
9. Suppose θ is an acute angle with $\sin \theta = \frac{2}{3}$. Compute the exact values of $\cos \theta$ and $\tan \theta$.
10. Suppose θ is an acute angle with $\sec \theta = \frac{7}{3}$. Compute the exact values of $\cos \theta$ and $\cot \theta$.
11. Determine a point $P(x, y)$ on the unit circle corresponding to an angle of measure -210° .
12. Find the exact value of $\cos 150^\circ$ without using a calculator.
13. Determine the exact value of $\tan 750^\circ$ without using a calculator.
14. Determine the sign (positive or negative) of each of the following without using a calculator: $\sin(-585^\circ)$, $\cos(-405^\circ)$, $\tan(930^\circ)$.

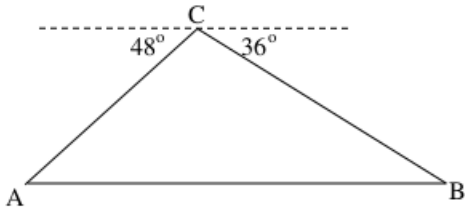
15. The expression $\tan \theta + \frac{\cos \theta}{1 + \sin \theta}$ can be simplified to a single trigonometric function. Find the function and justify your answer.
16. The expression $\frac{1 + \tan A}{1 + \cot A}$ can be simplified to a single trigonometric function. Find the function and justify the answer.
17. Suppose θ is an angle in quadrant III with $\tan \theta = 3$. Calculate the value of $\sin \theta$. Give both the exact value and a decimal approximation that is accurate to three decimal places.
18. Determine a point P on the terminal side of an angle θ in standard position which intersects the unit circle given that P is in quadrant III and $x = -\frac{3}{5}$.
19. If $f(x) = \sin x$ and $g(x) = \frac{1}{1 + x^2}$, determine $(g \circ f)\left(\frac{\pi}{2}\right)$.
20. Use your calculator to evaluate $\tan(37.3^\circ)$ accurately to three decimal places.
21. Evaluate $\sin(60^\circ)$. Give the exact answer and a decimal answer that is accurate to three decimal places.
22. Suppose θ is an acute angle with $\sin \theta = \frac{3}{4}$. Determine the exact value of $\sec \theta$.
23. Convert the expression $2 \tan^2 x + \frac{1}{\sec x + 2}$ into an expression involving only $\cos x$.
24. Which of the trigonometric functions has the largest value at 60° ?
25. Given $0 < x < 90^\circ$ and $\tan x = \frac{2}{\sqrt{3}}$, find $\sec x$.
26. Determine the reference angle for 335° .
27. Give the exact values of $\sin 240^\circ$, $\cos 240^\circ$, and $\tan 240^\circ$.
28. Give the exact values of $\sec 675^\circ$, $\csc 675^\circ$, and $\cot 675^\circ$.
29. Which of the six trigonometric functions have the property that $f(-x) = -f(x)$ (odd function)?
30. Determine a point $P(x, y)$ on the unit circle that corresponds to an angle -120° in standard position.
31. Given $90^\circ < x < 180^\circ$ and $\tan x = -2$, find $\sin x$ and $\cos x$.
32. The expression $(1 - \sin \theta)(\sec \theta + \tan \theta)$ can be expressed as a single trigonometric function for all θ . Determine the trigonometric function.
33. Simplify the expression $(\cos \theta - \sin \theta)^2 + \frac{2 \sin \theta}{\sec \theta}$ as much as possible.
34. Convert 43° into radians.
35. Convert $\frac{2\pi}{15}$ rad into degrees.
36. Determine the quadrant in which an angle of -4.35 radians lies. Assume the angle is in standard position.
37. List three positive angles in degree measure that have a sine value of $-\frac{\sqrt{3}}{2}$.
38. An arc of length 5 subtends a central angle of 24° on a circle. Determine the diameter of the circle.

39. Determine the area of the segment (shaded area) determined by a central angle of 130° in a circle of radius 5.

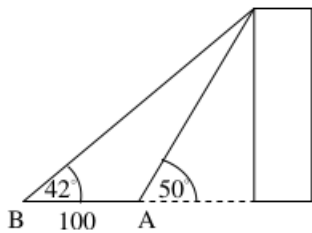


40. If $f(x) = \cos(\pi x)$ and $g(x) = 1 - 2x^2$, determine $(f \circ g)(1)$.

41. A plane flying at a height of 3.5 miles is at point C . At that point, the angle of depression to city A is measured to be 48° and the angle of depression to city B is measured to be 36° . Calculate the distance (in miles) between cities A and B .

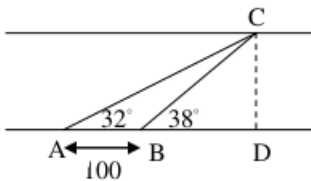


42. The angle of elevation to the top of a building at point A is 50° . At point B which is 100 ft farther away from the building than point A , the angle of elevation to the top of the building is 42° . Find the height of the building in feet.

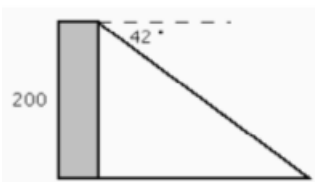


43. A rocket is fired from sea level and climbs at a constant angle with the horizontal of 72° . When the rocket is 45,000 feet high, what is the distance from the point at which the rocket was fired and the point directly below the rocket on level ground?

44. A surveyor wants to measure the width of a river. She picks a tree (point C) on the opposite side of the river and determines that $\angle CAB = 32^\circ$. She walks 100 ft along the river to point B and determines that $\angle CBD = 38^\circ$. Determine CD , the width of the river in feet.

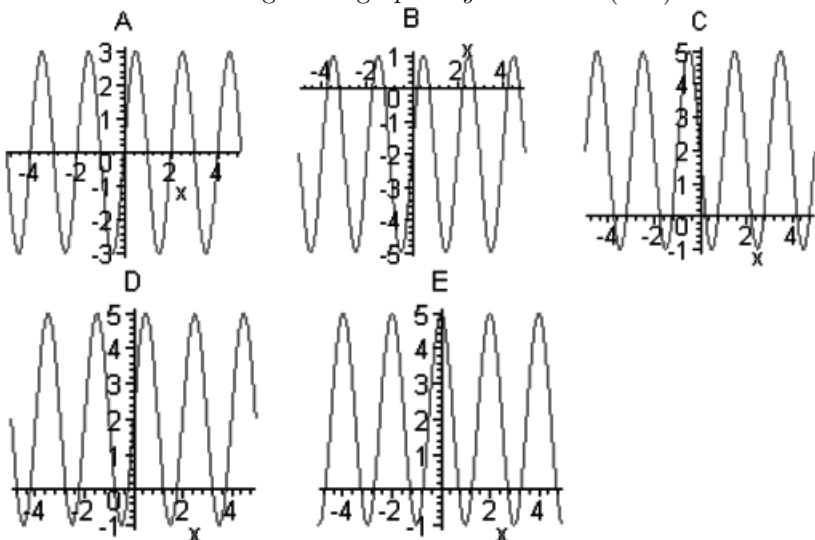


45. A person standing on a roof of a 200 ft building is looking down at another person on the ground. If the angle of depression is 42° , determine the distance between the bottom of the building and the person on the ground. Express your answer as an exact form and as a decimal accurate to three decimal places.

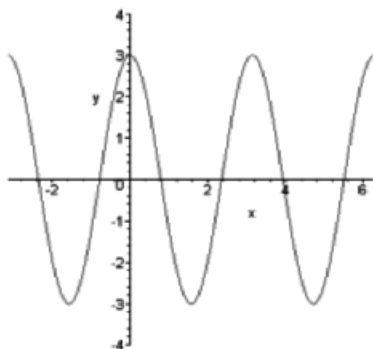


Chapter 6

- Assume $0 \leq x \leq 2\pi$. Give the domain of the function $f(x) = \frac{2}{1 + \cos x}$. Use interval notation.
- Consider the function $f(x) = \frac{3}{8} \cos(2x - \frac{\pi}{4})$. Give the amplitude, period, and phase shift of f .
- Give a formula for a periodic function of x that oscillates between 1 and 7 with period 2 and takes on the value 7 when $x = \frac{1}{2}$.
- Determine the range of the function $y = -2 + 3 \sin(4x + \frac{\pi}{2})$. Use interval notation.
- Which of the following is the graph of $y = 2 - 3 \sin(2\pi x)$?

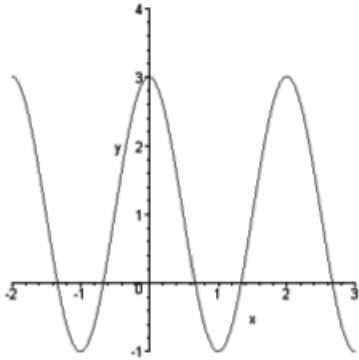


- For what values of x in the interval $[0, 2\pi]$ does the function $y = \tan 2x$ have vertical asymptotes?
- Determine the range of the function $y = 3 + \sec x$. Use interval notation.
- Which of the trigonometric functions have graphs that decrease over the interval $(0, \frac{\pi}{2})$?
- Sketch the graph of $y = 3 \sin(x - \frac{\pi}{4})$. Be sure to label the x -intercepts and turning points.
- Specify the period and amplitude for the function shown below.



- Find the amplitude, period, and frequency of the motion given by $s = -3 \cos(\frac{\pi}{6}t)$ over the interval $0 \leq t \leq 24$.
- Graph the function $y = -\cot(x - \frac{\pi}{4})$ on the interval $[-\pi, \pi]$. Specify any intercepts and asymptotes.

13. Determine the range of the function $y = 3 + \frac{5}{2} \cos\left(2x - \frac{\pi}{6}\right)$.
14. Construct a function of the form $y = A + B \sin(Ct - D)$ to model the daily temperature over a 24-hour interval. Assume $t = 0$ corresponds to midnight. Also assume the temperature varies between 65° and 75° with the lowest temperature occurring at 6:00am.
15. Determine the domain of the function $y = \sqrt{2 \sin x - 1}$ with $0 \leq x \leq 2\pi$.
16. Sketch the graph of $y = -3 \sin \frac{\pi x}{4}$.
17. Which of the trigonometric functions have graphs that are decreasing over the interval $\frac{\pi}{2} < x < \pi$?
18. Determine the range of the function $y = 2 + \frac{1}{3} \sin^2 x$.
19. Let $y = \tan\left(x - \frac{\pi}{6}\right)$. Give the first three positive values of x at which the graph of this function has vertical asymptotes.
20. Determine the range of the function $y = 3 + \sec\left(2x - \frac{\pi}{3}\right)$.
21. Determine the period of the function $y = 4 \cot \frac{2\pi x}{3}$.
22. Let $y = 2 \sec\left(x - \frac{\pi}{3}\right)$. Give the coordinates of the first two turning points on the graph of this function to the right of the y -axis.
23. Determine the period and amplitude of the function shown below.



24. Determine the coordinates of the first maximum turning point on the graph of $y = -2 \sin(\pi x)$.
25. Sketch the graph of $y = \csc(\pi x)$ on the interval $[-1, 2]$. Label all intercepts and asymptotes.

Chapter 5 Answers

1. $-0.9409, 2.179$

2. $\frac{2\pi}{5}$

3. 108°

4. 189.89 sq in

5. 12.043

6. 0.76

7. $\frac{5}{\sqrt{89}} \approx 0.53$

8. $\frac{9}{\sqrt{65}} \approx 1.12$

9. $\cos \theta = \frac{\sqrt{5}}{3}, \tan \theta = \frac{2\sqrt{5}}{5}$

10. $\cos \theta = \frac{3}{7}, \cot \theta = \frac{3}{\sqrt{40}}$

11. $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

12. $-\frac{\sqrt{3}}{2}$

13. $\frac{1}{\sqrt{3}}$

14. All positive

15. $\sec \theta$

16. $\tan A$

17. $-\frac{3\sqrt{10}}{10}$

18. $\left(-\frac{3}{5}, -\frac{4}{5}\right)$

19. $\frac{1}{2}$

20. 0.7618

21. $\frac{\sqrt{3}}{2}, 0.866$

22. $\frac{4\sqrt{7}}{7}$

23. $\frac{2(1-\cos^2 x)}{\cos x} + \frac{\cos x}{1+2\cos x}$

24. secant

25. $\frac{\sqrt{21}}{3}$

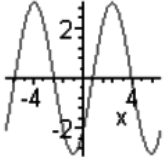
26. 25°

27. $-\frac{\sqrt{3}}{2}, -\frac{1}{2}, \sqrt{3}$
28. $\sqrt{2}, -\sqrt{2}, -1$
29. sine, tangent, cosecant, secant
30. $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
31. $\sin x = \frac{2}{\sqrt{5}}, \cos x = -\frac{1}{\sqrt{5}}$
32. $\cos \theta$
33. 1
34. $\frac{43\pi}{180}$
35. 24°
36. II
37. $\frac{4\pi}{3}, \frac{5\pi}{3}, \frac{10\pi}{3}$
38. 23.87
39. 18.79
40. -1
41. 7.97 miles
42. 368.3 ft
43. 14621.39
44. 32.04
45. 222.1

Chapter 6 Answers

1. $[0, \pi) \cup (\pi, 2\pi]$
2. $\frac{3}{8}, \pi, \frac{\pi}{8}$
3. $y = 4 + 3 \cos\left(\pi x - \frac{\pi}{2}\right)$
4. $[-5, 1]$
5. C
6. $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$
7. $(-\infty, 2] \cup [4, \infty)$
8. $\cos x, \cot x, \csc x$

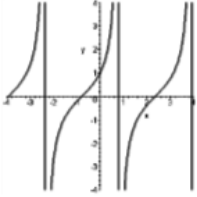
9. max at $(\frac{3\pi}{4}, 3)$, $(-\frac{5\pi}{4}, 3)$; min at $(-\frac{\pi}{4}, -3)$, $(\frac{7\pi}{4}, -3)$; intercepts at $x = -\frac{5\pi}{4}, -\frac{\pi}{4}, \frac{3\pi}{4}, \frac{7\pi}{4}$



10. Amplitude = 3, Period = 3

11. $\frac{1}{12}$

12.

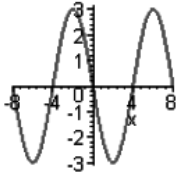


13. $[\frac{1}{2}, \frac{11}{2}]$

14. $y = 70 + 5 \sin(\frac{\pi}{12}t - \pi)$

15. $[\frac{\pi}{6}, \frac{5\pi}{6}]$

16.



17. $\sin x, \cos x, \cot x$

18. $[2, \frac{7}{3}]$

19. $\frac{2\pi}{3}, \frac{5\pi}{3}, \frac{8\pi}{3}$

20. $(-\infty, 2] \cup [4, \infty)$

21. $\frac{3}{2}$

22. $(\frac{\pi}{3}, 2), (\frac{4\pi}{3}, -2)$

23. Amplitude = 2, Period = 2

24. $(\frac{1}{2}, -2)$

25.

