

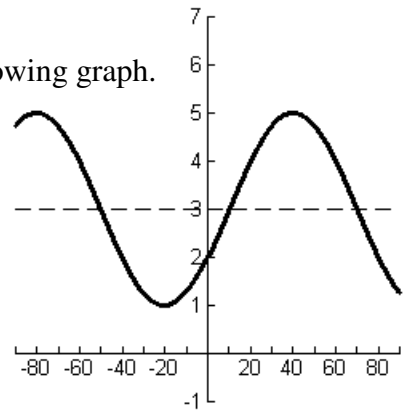
Trigonometry Final Exam Review

Chapter 1

1. Find the exact value of $\cos \theta$ if $\tan \theta = -3$ and θ terminates in quadrant II.
2. From a helicopter 5 km high, a cow is seen with an angle of depression of 21° . How far is it from a point on the ground directly below the helicopter to the cow?
3. Evaluate: $\sin 315^\circ$
4. Evaluate: $\theta = \cot^{-1} 8.05$
5. Evaluate $\cos 234.16^\circ$

Chapter 2

6. Evaluate: $\sin \frac{\pi}{3} \cos \frac{\pi}{6} + \cos \frac{\pi}{3} \sin \frac{\pi}{6}$
7. List the domains for the six trigonometric functions?
8. As you stop your car at a traffic light, a pebble becomes wedged between the tire treads. When the car starts to move, the distance of the pebble from the pavement varies sinusoidally with the distance the car has traveled. The period is the circumference of the wheel which is 32 inches in diameter. Write an equation that represents this function?
9. Write a positive sine equation in degrees that matches the following graph.



10-13. Consider the function $y = 6 + 4 \cos \frac{1}{2}(\theta + 20^\circ)$:

10. Find the amplitude.
11. Find the period.
12. Find the phase shift and the vertical shift.
13. Graph the function.

14. Find the exact value of $x = \sec\left(-\frac{\pi}{4}\right)$.
15. Convert $\frac{11\pi}{6}$ to degree measure.

Chapter 3

**List the Pythagorean and the sum and difference identities.
Develop the double angles and the half angle identities.**

16. Prove: $\frac{3 \cos^2 x - 2 \cos x - 1}{\cos x - 1} = 3 \cos x + 1$
17. Prove: $\cos\left(\frac{4x}{5}\right) \cos\left(\frac{x}{5}\right) - \sin\left(\frac{4x}{5}\right) \sin\left(\frac{x}{5}\right) = \cos x$
18. Use the identity for $\sin(A - B)$ to find $\sin 15^\circ$.
19. Find the exact value for $\cos 75^\circ$.
20. Solve for x if $\frac{2 \tan x}{1 - \tan^2 x} = \frac{\sqrt{3}}{3}$ when $x \in [0, 2\pi)$.

More Chapter 3

21. Prove: $\sin(\theta + 30^\circ) + \cos(\theta + 60^\circ) = \cos \theta$.
22. List the co-function identities.
23. Solve $2\sin \theta + 1 = 0$ when $\theta \in \mathbb{R}$.
24. Solve $2\sin^2 x = \sqrt{2} \sin x$ in $[0, 2\pi)$.
25. Prove $\frac{1 - \cos 2x}{\sin 2x} = \tan x$.

Chapter 4

26. List the ranges for the six circular inverse trig functions.
27. Evaluate. a) $\theta = \text{Arc cos}\left(-\frac{1}{2}\right)$ b) $x = \text{Arc cot}(-\sqrt{3})$
28. Graph the six circular inverse trig functions.
29. Evaluate. a) $\cos\left(\text{Arc sin}\left(-\frac{\sqrt{2}}{2}\right)\right)$ b) $\sin(\text{Arc sin}(-3))$

Chapter 5

30. Given triangle PIG, angle I is a right angle, angle P = 56° , and side i = 24.7, find side g.
31. Given triangle RAT, angle R = 37° , angle T = 52° , and side a = 13.6, find side t.
32. Given triangle MUD, and U = 109° , sides d = 163 and m = 32, find side u.
33. What is the area of triangle MUD in #35?
- 34-36. Gary walks out the front door of his apartment and gets on his bike. He rides 98 feet due south, on a bearing of 180° , then he turns and rides due west, on a bearing of 270° , for 126 feet.
34. How far is Gary from his apartment?
35. What is Gary's bearing from his apartment?
36. What is Gary's bearing back to his apartment?

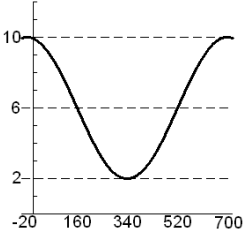
Chapter 6

37. Graph $r = 2 + 2\sin \theta$.
38. Convert $r = 10\sin \theta$ to standard rectangular form and name the conic section.
39. Convert $x^2 + (y - 2)^2 = 4$ to polar form, write r as a function of θ .
40. Given $z_1 = 3cis120^\circ$ and $z_2 = 12cis300^\circ$, find $z_1 z_2$ and $\frac{z_1}{z_2}$.
41. Find the fifth roots of $32cis300^\circ$.
42. Evaluate $(3 - 3i)^3$. Write your answer in EXACT rectangular form.

Supplemental

43. Find the arc length and the area of a sector with angle measure 2.6 radians that is contained in a circle of radius 13 meters.
44. The n th term in a sequence is given by $a_n = (-1)^{n+1}(3n+1)$. Find the 6th term in the sequence.
45. Find the n th term of the sequence $\left\{1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots\right\}$.
46. Find the sum of the squares of the first nineteen counting numbers.
47. Given the parametric equations $x = 4 \cos t$ and $y = 5 \sin t$, eliminate the parameter and write the rectangular equation.
- 48-50. Frankie hits a tennis ball off his roof which is 20 feet high. He hits the ball with an initial velocity of 40 feet per second at an angle of 32° with the horizontal.
48. Write the parametric equations that describe the position of the ball as a function of time.
49. When does the ball hit the ground?
50. What is the maximum height of the ball?

Trigonometry Final Exam Review Answers

1. $-\frac{\sqrt{10}}{10}$ 2. 13.025 km 3. $-\frac{\sqrt{2}}{2}$ 4. 7.081°
5. -0.586 6. 1 7. see notes 8. $y = 16 - 16 \cos \frac{1}{16}x$
9. $y = 3 + 2 \sin 3(\theta - 10^\circ)$ 10. 4 11. 720°
12. phase shift: -20° , vertical shift: 6 13.  14. $\sqrt{2}$
15. 330° **see notes in chapter 3 for identities
16. LS: $= \frac{(3 \cos x + 1)(\cancel{\cos x - 1})}{\cancel{\cos x - 1}} = 3 \cos x + 1 \square$
17. LS: $= \cos\left(\frac{4x}{5} + \frac{x}{5}\right) = \cos x \square$ 18. $\frac{\sqrt{6} - \sqrt{2}}{4}$ 19. $\frac{\sqrt{6} - \sqrt{2}}{4}$
20. $\frac{\pi}{12}, \frac{7\pi}{12}, \frac{13\pi}{12}, \frac{19\pi}{12}$ 21. LS: $= \sin \theta \cos 30 + \cos \theta \sin 30 + \cos \theta \cos 60 - \sin \theta \sin 60$
 $= \frac{\sqrt{3}}{2} \sin \theta + \frac{1}{2} \cos \theta + \frac{1}{2} \cos \theta - \frac{\sqrt{3}}{2} \sin \theta$
 $= \cos \theta \square$

22. see notes
23. $\theta = \begin{cases} 210^\circ + 360^\circ n \\ 330^\circ + 360^\circ n \end{cases}$
24. $0, \pi, \frac{\pi}{4}, \frac{3\pi}{4}$
25. LS: $= \frac{1 - (1 - 2\sin^2 x)}{2\sin x \cos x} = \frac{2\sin^2 x}{2\sin x \cos x} = \tan x$ □
26. see notes
27. a) 120° b) $\frac{5\pi}{6}$
28. see notes
29. a) $\frac{\sqrt{2}}{2}$ b) no solution
30. $g = 13.812$
31. $t = 10.719$
32. $u = 176.038$
33. $A = 2465.912 \text{ unit}^2$
34. 159.625 ft
35. 232.125°
36. 52.125°
- 37.
38. $x^2 + (y - 5)^2 = 25$, circle
39. $r = 4 \sin \theta$
40. $36 \text{cis} 60, \frac{1}{4} \text{cis} 180$
41. $2 \text{cis} 60, 2 \text{cis} 132, 2 \text{cis} 204, 2 \text{cis} 276, 2 \text{cis} 348$
42. $-54 - 54i$
43. 33.8 m, 219.7 m^2
44. $a_6 = -19$
45. $a_n = \frac{1}{2^{n-1}}$
46. 2470
47. $\frac{x^2}{16} + \frac{y^2}{25} = 1$
48. $x = (40 \cos 32)t$, and $y = -16t^2 + (40 \sin 32)t + 20$
49. 1.962 sec
50. 27.02 ft