

## Math 155 Pre-Test

- Simplify.**  $20 - 5[36 \div 3(2)]$
- Solve and write the solution in interval notation.**  $|5 - 2x| \geq 21$
- The life expectancy  $y$  for females born in the United States is given by the equation  $y = 0.16x + 71.6$ , where  $x$  is the number of years after 1950.**
  - Find the life expectancy of an American female born in 1980.
  - Find and interpret the slope of the equation. (4 pts)
  - Find and interpret the y-intercept of the equation. (4 pts)
- Find the equation of the line satisfying the given conditions.**  
Through  $(-2, -4)$  and  $(-4, -3)$ .
- Graph. Label at least two points on the graph.**  
 $y \leq -\frac{1}{2}x + 2$  and  $y > -1$
- Solve the system of equations.**  
 $4x - y = 9$   
 $\frac{2}{3}x + y = -9$
- A first number is 4 less than a second number. Four times the first number is 6 more than twice the second. Find the numbers.**
- Simplify.**
  - $-5a^7b^0c^{-9}$
  - $a^{28}a^7$
  - $\frac{x^{19}}{x^{12}}$
  - $\frac{x^{-9}}{y^{-3}}$
  - $a^4a^{-7}b^{-11}b$
- Simplify.**  $(4x^6y^5)^{-2} \cdot (6x^4y^3)$
- Solve.**  $x(5x - 7) = -2$
- Add or subtract as indicated. If possible, simplify your answer.**  
 $\frac{7}{x-1} + \frac{10x}{x^2-1} - \frac{5}{x+1}$
- Solve.**  $\frac{4x^2 - 24x}{3x^2 - x - 2} + \frac{3}{3x + 2} = \frac{-4}{x - 1}$

13. Add or subtract.  $2\sqrt{50} - 3\sqrt{125} + \sqrt{98}$

14. Solve.  $x - \sqrt{4-x} = 2$

15. Solve the inequality. Write the solution set in interval notation.

$$\frac{5}{x+1} \geq -2$$

16. Graph  $f(x) = -x^2 - 2x + 8$ . And find the following:

Vertex:	Axis of symmetry:
x-intercepts:	y-intercept:
Rightside Up or Upside Down	
Left or Right	# of units: _____
Up or Down	# of units: _____
Narrower or Wider	by a factor of: _____

17. Solve.  $\log_6 x + \log_6(x+1) = 1$

18. The graph of the equation is a circle. Find the center and the radius and then graph the circle.

$$x^2 + y^2 - 2x + 6y = 6$$

19. For the following functions:

i) Find the amplitude, the period, any vertical translation, and any phase shift.

If not applicable, write "none" in the blank.

ii) Graph over the interval  $-2\pi \leq x \leq 2\pi$ . Identify and label any asymptotes.

a)  $y = 4\sin\frac{1}{2}x$

b)  $y = -2\cos\left(x + \frac{3\pi}{4}\right)$

c)  $y = 2 - \sec x$

d)  $y = \cot\frac{1}{2}x$

20. Give the exact radian measure of  $y$  if it exists.

a)  $y = \arctan(-\sqrt{3})$

b)  $y = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

c)  $y = \sec^{-1}(2)$

d)  $y = \arcsin\left(-\frac{\sqrt{2}}{2}\right)$

21. Write the following trigonometric expression as an algebraic expression in  $u$ , for  $u > 0$ .

a)  $\cot(\sec^{-1} u)$

b)  $\cos(\arcsin u)$

22. Convert the following angles to decimal degrees. If applicable, round to the nearest hundredth of a degree.

a)  $76^\circ 48'$

b)  $34^\circ 51' 35''$

c)  $249^\circ 15'$

23. Identify the quadrant satisfying the given conditions:

a)  $\cos \theta < 0$  and  $\cot \theta > 0$

b)  $\tan \theta < 0$  and  $\csc \theta > 0$

24. Find the exact values of the six trigonometric functions for the given angles. Rationalize denominators when applicable.

a)  $135^\circ$

b)  $210^\circ$

c)  $270^\circ$

d)  $300^\circ$

25. Given  $\cos 2x = -\frac{5}{12}$  and  $90^\circ < x < 180^\circ$ , find the exact values of the following.

a)  $\sin x =$

b)  $\cos x =$

c)  $\tan x =$

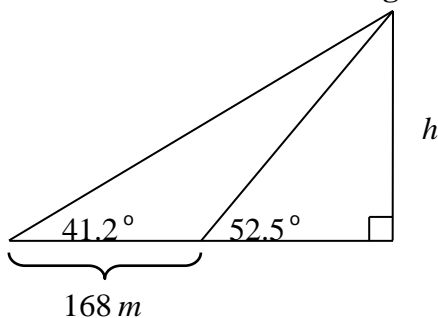
26. Given  $\csc x = -\frac{7\sqrt{5}}{5}$  and  $\cos x > 0$ , find the exact values of the following.

a)  $\sin 2x =$

b)  $\cos 2x =$

c)  $\tan 2x =$

27. Find  $h$  as indicated in the figure.



28. Solve the following problem. Include a labeled sketch in your work.

a) Starting at point A, a ship sails 18.2 km on a bearing of  $190^\circ$ , then turns and sails 47.4 km on a bearing of  $319^\circ$ . Find the distance of the ship from point A to the nearest tenth of a kilometer.

b) Francesco is flying in a hot air balloon directly above a straight road 3.4 mi long that joins two towns. He finds that the town closer to him is at an angle of depression of  $52.9^\circ$ , and the farther town is at an angle of depression of  $28.5^\circ$ . How high above the ground is the balloon? Round your answer to the nearest hundredth of a mile.

29. Use the appropriate half-angle identity to find the exact value of the following.

Work demonstrating use of appropriate identity must be shown.

a)  $\sin 202.5^\circ$

b)  $\tan 75^\circ$

30. Use the appropriate sum or difference identity to find the exact value of the following.

Work demonstrating use of appropriate identity must be shown.

a)  $\cos \frac{5\pi}{12}$

b)  $\tan \frac{13\pi}{12}$

c)  $\sin \frac{\pi}{12}$

31. Convert the following angles to radians. Leave answers as multiples of  $\pi$ .

a)  $110^\circ$

b)  $216^\circ$

32. Convert the following angles to degrees.

a)  $-\frac{4\pi}{15}$

b)  $\frac{8\pi}{5}$

33. Verify that each equation is an identity.

a)  $\frac{\sin \theta + \tan \theta}{1 + \cos \theta} = \tan \theta$

b)  $\sec^2 \theta \csc^2 \theta = \sec^2 \theta + \csc^2 \theta$

c)  $\cot \theta - \tan \theta = \frac{\cos 2\theta}{\sin \theta \cos \theta}$

d)  $\tan 8\theta - \tan 8\theta \tan^2 4\theta = 2 \tan 4\theta$

34. Solve the following equations for all exact solutions in radians.

*Write answers using the least possible nonnegative angle measures.*

a)  $2 \sin x - \sqrt{3} = 0$

b)  $\cos x + 1 = 2 \sin^2 x$

35. Solve the following for all solutions in degrees. Use exact values for  $x$  whenever possible.

*If necessary, approximate answers to the nearest tenth of a degree.*

*Write answers using the least possible nonnegative angle measures.*

a)  $3 \cot 3x = \sqrt{3}$

b)  $2 - \sin 2x = 4 \sin 2x$

36. Solve the following equation over the interval  $[0^\circ, 360^\circ)$ . Use exact values for  $x$  whenever possible. If necessary, approximate answers to the nearest tenth of a degree.

a)  $5 \tan^2 x + 16 \tan x = 40$

b)  $5 \sec^2 x = 3 + 3 \sec x$

c)  $2 \sin^2 x = 1$

37. Use DeMoivre's Theorem to find  $(2 - 2i\sqrt{3})^6$ . Write your answer in rectangular form.

38. Convert the following to polar coordinates with  $0^\circ \leq \theta < 360^\circ$  and  $r > 0$ .

a)  $(-1, \sqrt{3})$

b)  $(\sqrt{2}, -\sqrt{2})$

39. A golf ball is hit from the ground with initial velocity of 150 feet per second at an angle of  $60^\circ$  with the ground.

The parametric equations that model the path of the rocket are given by

$$x = 75t$$

$$y = -16t^2 + 75\sqrt{3}t$$

Determine a rectangular equation that models the path of the projectile.

*Use exact values for any numbers in the equation.*