This review, produced by the Broward Teaching Center, contains a collection of questions which are representative of the type you may encounter on the exam. Other resources made available by the Teaching Center include:

- Walk-In tutoring at Broward Hall
- Private-Appointment, one-on-one tutoring at Broward Hall
- Walk-In tutoring in LIT 215
- Supplemental Instruction
- Video resources for Math and Science classes at UF
- Written exam reviews and copies of previous exams

The teaching center is located in the basement of Broward Hall:

You can learn more about the services offered by the teaching center by visiting https://teachingcenter.ufl.edu/
1. Graph the following trigonometric functions

   (a) \( f(x) = 2 \cos\left(3x + \frac{\pi}{2}\right) \)

   (b) \( g(x) = -2 \tan\left(x + \frac{\pi}{4}\right) \)

   (c) \( h(x) = \csc\left(\pi x - \frac{\pi}{2}\right) \)

2. Determine all values of \( x \) such that \( g(x) = -\tan\left(4x + \frac{\pi}{3}\right) \) has vertical asymptotes.

3. Two surveyors plan to measure the height of a building, but do not have a tool for doing so directly. Both surveyors stand directly in front of the building, one fifty feet behind the other. To see the top of the building, the nearer surveyor has to look up, at a \( 50^\circ \) angle. Similarly, the further surveyor must look up at angle of \( 32^\circ \) to see the top.

   (a) Sketch a diagram including the building, and both surveyors, labeling all known angles and distances.

   (b) Assuming the surveyor’s heights are negligible, determine the height of the building.

4. A helicopter is hovering at a fixed altitude between two women standing 100 feet apart from each other. One woman measures the angle of elevation between herself and the helicopter to be \( 25^\circ \), and the other measures the angle of elevation between herself and the helicopter to be \( 40^\circ \).

   (a) Sketch a diagram including the helicopter and both women. Label all known distances and angles.

   (b) Determine the altitude of the helicopter.

5. Determine (where possible) the value of the following expressions

   (a) \( \sin(\sin^{-1}(1)) \)

   (b) \( \cos(\cos^{-1}(\sqrt{2}/2)) \)

   (c) \( \cos^{-1}(\cos(-5\pi/6)) \)

   (d) \( \tan(\cos^{-1}(-\sqrt{3}/2)) \)

   (e) \( \tan(\sin^{-1}(1/3)) \)

   (f) \( \sin^{-1}(\sin(2)) \)

   (g) \( \cos^{-1}(\sin(\pi/3)) \)

   (h) \( \sin^{-1}(\sin(8\pi/7)) \)
6. Rewrite the following as algebraic expressions
   (a) \( \tan(\sin^{-1}(u)) \)
   (b) \( \csc(\cos^{-1}(x/3)) \)

7. Use trigonometric identities to simplify \( \frac{\cos^3(\theta) - \sin^3(\theta)}{1 + \cos(\theta) \sin(\theta)} \).

8. An aircraft takes off headed N15\(^\circ\)E, and flies in that direction for one mile. Then the aircraft turns 90\(^\circ\) toward the North-West and travels in this direction for two miles. At this moment, what is the bearing from the airport where the aircraft took off to the position of the aircraft?

9. Verify the following identities
   (a) \( \frac{1 - \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 - \sin \theta} = 2 \sec \theta \)
   (b) \( \frac{\csc \theta + \cot \theta}{\cot \theta} = \frac{\tan^2 \theta}{\sec \theta - 1} \)
   (c) \( \csc^6 x \cot x = (\cot x + 2 \cot^3 x + \cot^5 x) \csc^2 x \)

10. Evaluate using the periodicity and even/odd properties:
    (a) \( \cot \left( -\frac{17\pi}{2} \right) \)
    (b) \( \sin \left( -\frac{7\pi}{3} \right) \)
    (c) \( \cos \left( \frac{11\pi}{6} \right) \)
    (d) \( \tan \left( \frac{7\pi}{4} \right) \)
    (e) \( \csc(570\^\circ) \)
    (f) \( \sec(-450\^\circ) \)

11. Suppose \( \sin(\theta) = \frac{1}{4} \) and \( \cot(\theta) > 0 \). Find:
    (a) \( \cos(\theta) \)
    (b) \( \tan(\theta) \)
    (c) \( \sec(\theta) \)
    (d) \( \csc(\theta) \)
12. Suppose the terminal side of $\theta$ lies on the line $2x + 3y = 0$ in quadrant IV. Find the values of the six trigonometric function of $\theta$.

13. See below:
   
   (a) Calculate $\cos\left(\frac{\pi}{2} - \theta\right)$, assuming $\cos(\theta) = \frac{1}{4}$.
   
   (b) Calculate $\cos\left(\frac{\pi}{2} - \theta\right)$, assuming $\cot(\theta) = 3$.

14. Perform the operations and simplify:
   
   a) $(1 + \tan x)^2 - 2 \tan x$
   
   b) $\sin t + \cot t \cos t$
   
   c) $\frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{1 + \sin \theta}$

15. Factor:
   
   a) $\sin^3 \theta - \cos^3 \theta$
   
   b) $2 \sec^2 x + 3 \tan x - 1$