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. Perform the indicated operations.
   (a) \( \frac{3^{-1} + 2}{3 + 2^{-1}} \)
   (b) \( \left( \frac{1}{2} + \frac{1}{2} \right)^2 \)
   (c) \( \frac{5 \cdot \frac{3}{2} + 3}{\frac{1}{3} + \frac{2}{3} - 2} \)

2. Simplify the expression \( \frac{(3x + 2)^{1/2}(x - 6)^2 + (x - 6)^3(3x + 2)^{-3/2}}{\sqrt{3x + 2}} \).

3. Find the equation of a line passing through \((1, 1)\) which is perpendicular to \(2y - x = 5\).

4. Find the domain of each function below.
   (a) \( f(x) = \frac{x^3 - 5x^2 + 6x}{(x - 2)\sqrt{2x - 1}} \)
   (b) \( B(t) = \frac{t}{e^t - 1} \)
   (c) \( g(x) = \frac{\sin(\pi x)}{\sqrt{x^5 - x}} \)
   (d) \( \omega(z) = \sec(\pi z) + \tan(\pi z) \)
   (e) \( h(x) = (\ln(x + 1))^{-1} \)
   (f) \( F(s) = \frac{\tan^{-1}(s)}{\sin^{-1}(s)} \)

5. Find a polynomial of minimal degree, with real coefficients, that has \(-3i, 1,\) and \(1 + i\) as roots.

6. Factor the polynomial \( f(x) = 2x^4 + 7x^3 - 4x^2 - 27x - 18 \) into a product of linear terms.
7. Solve each system of equations.

(a) \[
\begin{align*}
2x - 3y &= -2 \\
4x + y &= 24
\end{align*}
\]

(b) \[
\begin{align*}
x^2 + y^2 &= 10 \\
2x + y &= 1
\end{align*}
\]

8. Use the remainder theorem to evaluate \( f(-2) \) where \( f(x) = 3x^3 + 8x^2 + 5x - 7 \)

9. What is the largest value attained by the function \( f(x) = -x^2 - 8x + 16 \)?

10. Determine the exact values without a calculator

(a) \( \cos \left( \frac{11\pi}{4} \right) \)

(b) \( \sin(27\pi) \)

(c) \( \sec \left( -\frac{13\pi}{3} \right) \)

(d) \( \tan \left( -\frac{17\pi}{6} \right) \)

11. Given \( \csc(\theta) = 2 \) and \( \tan(\theta) > 0 \) find the value of the six trigonometric functions.

12. A tent in the shape of an isosceles-triangular prism is 4 meters tall at its center. When erected, the sides of the tent make an angle of \( 60^\circ \) with the ground. How wide is the tent?

13. The population of rabbits in Lenny’s hutch can be modeled exponentially by a function of the form \( P(t) = Ae^{bt} \) where \( t \) is measured in months and \( A \) and \( b \) are real constants. George initially gives Lenny 2 rabbits, and warns that they will double in population every two months.

(a) Determine the constants \( A \) and \( b \) in the modeling function \( P(t) \).

(b) After how many months will the population exceed one hundred rabbits?
14. Solve the following equations.

(a) \(5^{x-2} = \frac{1}{125}\)  
(b) \(\tan^2(x) + \tan(x) - 12 = 0\)  
(c) \(t = \sqrt{3} - 2t\)  
(d) \(5e^{2-x} = 125\)  
(e) \((2 \sin^2(\theta) - \sqrt{3} \sin(\theta))(\cos(\theta) + 1) = 0\)  
(f) \(|z - 2| = 1\)  
(g) \(x \ln(x) - \sqrt{2}x = 0\)  
(h) \(2 \sin^2(t) + 3 \cos(t) = 3\)

15. A particle orbiting the origin has, at time \(t\), the \(y\)-component \(y(t) = \frac{1}{12}(\cos(8t) - 3 \sin(8t))\). At what times \(t\) will the particle lay on the \(x\)-axis?

16. Write \(\cos(\tan^{-1}(1) + \cos^{-1}(x))\) as an algebraic expression.

17. Sketch the graphs of the following functions. Label at least two points on each graph.

(a) \(f(x) = 4 - (x + 2)^4\)  
(b) \(g(x) = \log_5(x + 1)\)  
(c) \(M(x) = \frac{1}{|x+1|}\)  
(d) \(h(x) = 2 + e^{1-x}\)  
(e) \(\ell(x) = \ln|x|\)  
(f) \(\Psi(t) = 4 \sin \left(t - \frac{\pi}{4}\right) + 1\)

18. Sketch the graph of the piecewise function. Label any discontinuities, and find its domain.

\[f(x) = \begin{cases} 
2 - x^2 & \text{if } x < -1 \\
1 + \sqrt{x + 1} & \text{if } -1 < x < 1 \\
e^{x-1} - 1 & \text{if } x \geq 1 
\end{cases}\]