A. Sign and date your scantron on the back at the bottom.

B. In pencil, write and encode in the spaces indicated on your scantron:
   1) Name (last name, first initial, middle initial)
   2) UF ID Number
   3) Section Number

C. Under "special codes" on your scantron, code in the test ID number 5, 1.
   1 2 3 4 • 6 7 8 9 0
   • 2 3 4 5 6 7 8 9 0

D. At the top right of your scantron, for “Test Form Code”, encode A.
   • B C D E

E. 1) There are twenty-one 5-point multiple-choice questions for a total of 105 points.
   2) The time allowed is 120 minutes.
   3) You may write on the test.
   4) Raise your hand if you need more scratch paper or if you have a problem with your test. DO NOT LEAVE YOUR SEAT UNLESS YOU ARE FINISHED WITH THE TEST.

F. KEEP YOUR SCANTRON COVERED AT ALL TIMES.

G. When you are finished:
   1) Before turning in your test, check for transcribing errors. Any mistakes you leave in are there to stay.
   2) Take your test, scratch paper, and scantron to your TA. Be prepared to show your UF ID card.
   3) Answers will be posted in E-Learning after the exam.

H. By taking this exam, you agree to the following Honor Pledge:
   “I will neither give nor receive any unauthorized aid for this exam.”
1. Use the Leading Coefficient Test to determine the end behavior of

\[ f(x) = 3x^4 - 15x^2 + 18x. \]

A. Rises to the left, rises to the right  
B. Falls to the left, falls to the right  
C. Falls to the left, rises to the right  
D. Rises to the left, falls to the right

2. Graph the function and determine the intervals on which it is decreasing:

\[ f(x) = \begin{cases} 
-2x + 3 & \text{if } x < -2, \\
7 & \text{if } -2 \leq x < 1, \\
(x - 4)^2 - 2 & \text{if } x \geq 1. 
\end{cases} \]

A. \((\infty, -2) \cup (1, \infty)\)  
B. \((-2, -1) \cup (1, \infty)\)  
C. \((-\infty, -1) \cup (1, 4)\)  
D. \((-4, -1) \cup (4, \infty)\)  
E. \((-\infty, -2) \cup (4, \infty)\)

3. Perform the operation and simplify.

\[ \frac{\sin \theta}{1 + \cos \theta} + \frac{\cos \theta}{\sin \theta} \]

A. \(\csc \theta\)  
B. \(\cos^2 \theta\)  
C. \(\csc^2 \theta\)  
D. \(\sec \theta\)  
E. \(\sin^2 \theta\)
4. Simplify: \((4x)^{5/2} \cdot 4^{-3/2} \cdot x^{-6}\).

   \begin{align*}
   \text{A. } & \frac{\sqrt{2x}}{2x^4} & \text{B. } & \frac{4\sqrt{x}}{x^4} & \text{C. } & \frac{\sqrt{x}}{2x^4} & \text{D. } & \frac{4}{|x|} & \text{E. } & \frac{2\sqrt{x}}{x^4}
   \end{align*}

5. Find the period of \(y = \frac{7}{3} \cos \left(\frac{4}{9}x\right)\).

   \begin{align*}
   \text{A. } & \frac{4\pi}{9} & \text{B. } & \frac{8\pi}{9} & \text{C. } & \frac{9\pi}{2} & \text{D. } & \frac{6\pi}{7} & \text{E. } & \frac{9\pi}{8}
   \end{align*}

6. Calculate \((f \circ g)(x)\) when \(f(x) = x^2 + 4x\) and \(g(x) = x + 2\).

   \begin{align*}
   \text{A. } & x^2 + 8x + 2 & \text{B. } & x^2 + 7x + 10 & \text{C. } & x^2 + 8x + 12 \\
   \text{D. } & x^2 + 8x + 6 & \text{E. } & x^2 + 8x + 4
   \end{align*}
7. Given \( \cos u = -\frac{3}{5} \) and \( \tan u > 0 \), find \( \sin 2u \).

A. Correct answer is not given.
B. \( \frac{24}{25} \)
C. \( \frac{7}{25} \)
D. \( -\frac{7}{25} \)
E. \( -\frac{24}{25} \)

8. Given \( f(x) = \frac{x^2 + x - 6}{x^2 + 2x - 8} \), which are true?

P. The \( x \)-intercepts is \((-3,0)\) only.
Q. The \( y \)-intercept is \((0,0)\).
R. There is a hole in the graph at \((2,0)\).

A. P only
B. Q only
C. They are all false.
D. P, and Q only
E. R only
9. Given \( y = \sqrt{2x - 4} \), which are true?

   P. The \( x \)-intercept is \((4, 0)\).
   Q. The \( y \)-intercept is \((0, -2)\).
   R. The graph is symmetric with respect to the \( x \)-axis.

   A. Q only  
   B. P only  
   C. R only  
   D. P and Q only  
   E. They are all false.

10. The Chemistry Club and the German Club had their meeting at the local pizza place. 
The Chemistry Club had three large pizzas and four pitchers of coke for a cost of $61. 
The German Club had two large pizzas and three pitchers of coke for a cost of $42. 
Find the total cost of one large pizza and one pitcher of coke. Hint: Solve the system 
of equations first, then add up the cost of one large pizza and one pitcher of coke.

   A. 18  
   B. 20  
   C. 19  
   D. 16  
   E. 17

11. Write an algebraic expression equivalent to the given expression.

   \( \cot \left( \arccos \left( \frac{\sqrt{x}}{3} \right) \right) \)

   A. \( \frac{\sqrt{9-x}}{x} \)  
   B. \( \frac{\sqrt{x}}{9-x} \)  
   C. \( \frac{\sqrt{9x-x^2}}{9-x} \)
   D. \( \frac{\sqrt{x}(9-x)}{x} \)  
   E. \( \frac{\sqrt{9-x}}{\sqrt{x}} \)
12. Solve the inequality.

\[
\frac{5 + 7x}{1 + 2x} \leq 4
\]

A. \((-\infty, -1/2) \cup [1, \infty)\)
B. \((-\infty, -1) \cup (1/2, \infty)\)
C. \([1, \infty)\)
D. \((-1/2, 1]\)
E. \((-\infty, -1] \cup [1/2, \infty)\)

13. Solve the absolute value inequality.

\[6 - |x + 1| < 2\]

A. \((-7, 3)\)
B. \((-4, 4)\)
C. \((-\infty, -4) \cup (4, \infty)\)
D. \((-\infty, -5) \cup (3, \infty)\)
E. \((-\infty, -7) \cup (3, \infty)\)

14. Find an equation of the line passing through \((-3, 2)\) and perpendicular to the line \(3x + 4y = 7\).

A. \(4x + 3y + 1 = 0\)
B. \(4x - 3y + 18 = 0\)
C. \(3x + 4y + 1 = 0\)
D. \(4x + 3y + 6 = 0\)
E. \(3x - 4y + 17 = 0\)
15. Which are true?
   
P. The graph of \( f(x) = \log_2 x \) contains the point (8, 3).
Q. The domain of \(-\log_3 x + 2\) is \((-2, \infty)\).
R. The x-intercept of \( h(x) = \log_4(x - 3) \) is 4.

A. P, Q only  
B. P, R only  
C. Q, R only  
D. P only  
E. R only

16. A passenger in an airplane at an altitude of 10 kilometers sees two towns directly to the east of the plane. The angles of depression to the towns are 30° and 45°. How many kilometers apart are the towns?

A. \(5\sqrt{3} - 5\)  
B. \(5\sqrt{3} - 10\)  
C. \(\frac{5\sqrt{3} - 10}{2}\)  
D. \(10\sqrt{3} - 5\)  
E. \(10\sqrt{3} - 10\)

17. Find the solution to each equation below. What is \(x + y?\)
\[2^{x-3} = 16 \quad \text{and} \quad 4\log_5 6y = 12\]

A. \(\frac{163}{6}\)  
B. \(\frac{165}{6}\)  
C. \(\frac{161}{6}\)  
D. \(\frac{167}{6}\)  
E. \(\frac{141}{6}\)

18. Find the exact value of sec \(\left(\frac{\pi}{12}\right)\).

A. \(2\sqrt{3} - 2\sqrt{2}\)  
B. \(\sqrt{6} - \sqrt{2}\)  
C. \(-\sqrt{6} - \sqrt{2}\)  
D. \(\sqrt{6} + \sqrt{2}\)  
E. \(2\sqrt{3} + 2\sqrt{2}\)
19. Graph \( f(x) = 4^{x-2} - 3 \). Which are true?

P. The horizontal asymptote is \( y = 2 \).
Q. The graph is found in quadrants I, III and IV only.
R. The domain is \((2, \infty)\).

A. They are all false.  
B. Q and R only 
C. P and R only 
D. P only 
E. Q only 

20. Perform the operation and write the answer in standard form:

\[(2 + 3i)(4 - 5i).\]

A. \(-7 + 2i\)  
B. \(8 - 15i\)  
C. \(8 + 15i\)  
D. \(6 - 2i\)  
E. \(23 + 2i\)

21. Find all solutions of the equation. \( \frac{1}{3} \tan^2 \left( \frac{x}{2} \right) = 1 \)

A. \(\frac{2\pi}{3} + 2\pi n\) or \(\frac{4\pi}{3} + 2\pi n\)  
B. \(\frac{\pi}{3} + 4\pi n\) or \(\frac{2\pi}{3} + 4\pi n\)  
C. \(\frac{2\pi}{3} + 4\pi n\) or \(\frac{4\pi}{3} + 4\pi n\)  
D. \(\frac{\pi}{3} + \pi n\) or \(\frac{2\pi}{3} + \pi n\)  
E. \(\frac{\pi}{3} + 2\pi n\) or \(\frac{2\pi}{3} + 2\pi n\)