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 — Do not fill this out.

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

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

E.  1) The answer to every question is E
    2) The time allowed is .
    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.”
The answer to each question is E.

1. Factor: \(x^4 - 8x^3 + 23x^2 - 28x + 12\)

   A. \((x - 2)^2(x - 3)^2(x - 1)\)  
   B. \((x - 2)(x - 3)(x - 1)^2\)  
   C. \((x - 2)(x - 3)^2(x - 1)\)  
   D. \((x - 2)^2(x - 3)(x - 1)^2\)  
   E. \((x - 2)^2(x - 3)(x - 1)^2\)

2. The function \(f(x)\) is linear with \(f(8) = -43\). Its graph is parallel to the line that passes through the points \((-9, 24)\) and \((7, -88)\). Find the formula for \(f(x)\) in slope-intercept form.

   A. \(f(x) = \frac{1}{7}x - 13\)  
   B. \(f(x) = \frac{1}{7}x + 13\)  
   C. \(f(x) = 7x + 13\)  
   D. \(f(x) = -7x - 13\)  
   E. \(f(x) = -7x + 13\)

3. How many solutions does the system below have?

   \[
   \begin{align*}
   xy &= -12 \\
   |x + y| &= 1
   \end{align*}
   \]

   A. 0  
   B. 1  
   C. 2  
   D. 3  
   E. 4

4. Which interval satisfies the inequality \(-3(x - 4)(x - 7)^2(x - 11) \geq 0\)?

   A. \((-\infty, 4] \cup [11, \infty)\)  
   B. \((-\infty, 11)\)  
   C. \((-\infty, \infty)\)  
   D. \([11, \infty)\)  
   E. \([4, 11]\)

5. The graph of a polynomial \(p(x)\) has two \(x\)-intercepts and three turning points. What is the smallest number of complex zeros that \(p(x)\) could have?

   A. 1  
   B. 0  
   C. 4  
   D. 3  
   E. 2
6. Which point is the vertex of the parabola \( h(x) = 3x^2 + 24x + 1 \)?

- A. \((0, 1)\)
- B. \((-4, 0)\)
- C. \((-4, 1)\)
- D. \((0, -47)\)
- E. \((-4, -47)\)

7. Suppose that \( f(x) = ax^2 + bx + c \) is a quadratic function with \( x \)-intercepts \(-7\) and \(9\), and \( f(0) < 0 \). Which of the following must be true of \( f(x) \)?

I. \( \frac{-b}{2a} = 2 \)

II. \( c > 0 \)

III. The graph of \( f(x) \) opens upward.

- A. I only
- B. II only
- C. II and III only
- D. I, II, and III
- E. I and III only

8. What is the vertex of the parabola with \( x \)-intercepts 3 and 9 and \( y \)-intercept \(-81\)?

- A. \((0, 0)\)
- B. \((0, -81)\)
- C. \((3, 9)\)
- D. \((27, 6)\)
- E. \((6, 27)\)

9. Suppose that \( f(x) \) is a polynomial with real coefficients and that \( 5 + 2i \) is a zero of \( f(x) \). Which of the expressions below must be a factor of \( f(x) \)?

- A. \( x \)
- B. \( x^2 + 10x + 21 \)
- C. \( x + 5 \)
- D. \( x^2 + 29 \)
- E. \( x^2 - 10x + 29 \)
10. Perform the operation and choose the correct result: \((3 + 8i)^2\)

A. \(9 + 64i\)  
B. 73  
C. \(6 + 16i\)  
D. \(-55\)  
E. \(-55 + 48i\)

11. Identify the horizontal asymptote of the function: \(f(x) = \frac{15x + 11}{3x + 5}\)

A. \(y = 2\)  
B. \(y = -\frac{11}{5}\)  
C. \(y = 0\)  
D. \(y = -\frac{5}{3}\)  
E. \(y = 5\)

12. Which statement correctly describes the long-term behavior of \(f(x) = \frac{3x^5 + 7x^3 + 2x^2 + 9x + 5}{x^2 + 6x + 4}\)?

A. As \(x \to \infty\), \(f(x) \to 4\). As \(x \to -\infty\), \(f(x) \to 4\).
B. As \(x \to \infty\), \(f(x) \to 3\). As \(x \to -\infty\), \(f(x) \to -3\).
C. As \(x \to \infty\), \(f(x) \to 3\). As \(x \to -\infty\), \(f(x) \to 3\).
D. As \(x \to \infty\), \(f(x) \to \infty\). As \(x \to -\infty\), \(f(x) \to \infty\).
E. As \(x \to \infty\), \(f(x) \to \infty\). As \(x \to -\infty\), \(f(x) \to -\infty\).

13. Identify the vertical asymptotes of the function \(g(x)\).

\(g(x) = \frac{x^2 - 16x + 55}{x^2 - 13x + 22}\)

A. \(x = 5, x = 11, x = 2\) only  
B. \(x = 11, x = 2\) only  
C. \(x = 11\) only  
D. \(x = 5\) only  
E. \(x = 2\) only
14. Evaluate: \((i^{59})^3\)

A. 1  B. \(-1\)  C. \(-i\)  D. 0  E. \(i\)

15. What is the equation for the line that is perpendicular to the \(x\)-axis and passes through the point (4, 9)?

A. \(y = x\)  B. \(y = -x + 13\)  C. \(y = x + 5\)
D. \(y = 9\)  E. \(x = 4\)

16. Use long or synthetic division to simplify the expression:

\[
\frac{x^3 - 3x^2 + 3x - 1}{x - 1}
\]

A. \(x^2 - 4x - 1 + \frac{2}{x-1}\)  B. \(x^2 - 4x - 1 + \frac{2}{x-1}\)  C. \(x^2 - 3x + 3 + \frac{1}{x-1}\)
D. \(x^2 + 2x - 3, \ x \neq 1\)  E. \(x^2 - 2x + 1, \ x \neq 1\)

17. Suppose that \(h(x) = 15x^5 + x^4 + 5x^3 - 8x^2 + 10x + 14\).

According to the rational zero test, which of the following is not a possible zero of \(h(x)\)?

A. 1  B. \(\frac{2}{3}\)  C. \(\frac{7}{5}\)  D. \(\frac{14}{5}\)  E. \(\frac{8}{3}\)
18. A polynomial $h(x)$ has a zero at $x = -2$ with multiplicity 1 and a zero at $x = 4$ with multiplicity 2. Choose the graph which could be the graph of $h(x)$.

A. 

B. 

C. 

D. 

E. 