Directions:

- Do not remove this page—you will turn in the entire exam. You have two hours to do this exam. No books or notes may be used. You may use a graphing calculator during the exam, but NO calculator with a Computer Algebra System (CAS) or a QWERTY keyboard is permitted. Absolutely no cell phone use during the exam is allowed.

- The exam consists of multiple choice and short answer questions. Record your answers on this page by filling in the appropriate selection, for example:

  A B C D E

- The exam is out of 100 total points: 5 points for each of 20 questions. Only this front page will be graded and no partial credit will be awarded. It is recommended that you check your work!

1. A B C D E
2. A B C D E
3. A B C D E
4. A B C D E
5. A B C D E
6. A B C D E
7. A B C D E
8. A B C D E
9. A B C D E
10. A B C D E
11. A B C D E
12. A B C D E
13. A B C D E
14. A B C D E
15. A B C D E
16. 
17. 
18. 
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20. 

For grading use:

<table>
<thead>
<tr>
<th>Total</th>
<th>(out of 100 pts)</th>
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Multiple Choice: Show your work in the space below and shade the correct answer on the front page for each of the following.

1. Solve the following equation for \( x \).

\[ 3x^2 - 5x = 1 \]

Choices:
(a) \( \frac{1 \pm \sqrt{13}}{2} \)
(b) \( \frac{5 \pm \sqrt{37}}{6} \)
(c) \( \frac{-5 \pm \sqrt{37}}{6} \)
(d) There are no real solutions.
(e) \( \frac{5 \pm \sqrt{13}}{6} \)

2. Which one of the following points is on the graph of the equation

\[ x - x^2 y = 5? \]

Choices:
(a) \( (0,5) \)
(b) \( (1,4) \)
(c) \( (-1,-6) \)
(d) \( (-1,6) \)
(e) \( (-2,-1) \)
3. Solve the following equation for $s$.

$8(3-s)^2 = 16$

Choices:
(a) $\pm \sqrt{5}$
(b) $\sqrt{8}$
(c) $\sqrt{2}$
(d) The equation can not be solved for $s$.
(e) $3 \pm \sqrt{2}$

4. Solve the following equation for $x$.

$\sqrt{2x-1} = x-2$

Choices:
(a) The equation has no solutions.
(b) $x = 1$ only.
(c) $x = 1$ and $x = 5$.
(d) $x = 5$ only.
(e) $x = -3$ and $x = 2$.

5. Solve the following equation for $x$.

$x^2(x^2+5) = 0$

Choices:
(a) The equation has no solutions.
(b) $x = 0$ only.
(c) $x = \sqrt[3]{-5}$ only.
(d) $x = 0$ and $x = \sqrt[3]{5}$.
(e) $x = \pm \sqrt[3]{5}$ only.
6. Find the value of \( k \) that makes the following expression a perfect square.
\[ x^2 - 6x + k. \]

Choices:
(a) 3
(b) 9
(c) \( \frac{3}{2} \)
(d) -9
(e) \( \frac{-9}{4} \)

7. Solve the following equation for \( x \).
\[ |x + 5| = 2 \]

Choices:
(a) \( x = -3 \) and \( x = -7 \).
(b) \( x = -3 \) only.
(c) \( x = 3 \) only.
(d) \( x = 7 \) only.
(e) \( x = -1 \) only.

8. Find the distance between the points \((-2, 1)\) and \((1, -3)\).

Choices:
(a) \( \sqrt{5} \)
(b) \( \sqrt{7} \)
(c) 5
(d) \( \pm 5 \)
(e) 25
9. Find the exact value of \( |\sqrt{2} - 3| \).

**Choices:**

(a) \( \sqrt{2} + 3 \).
(b) \( 3 - \sqrt{2} \)
(c) \( 1.5858 \)
(d) \( -3 + \sqrt{2} \)
(e) \(-1\)

10. Find \( k \) so that the following equation has only one solution.
\[
x^2 - 3x + k = 0
\]

**Choices:**

(a) \( -\frac{4}{9} \)
(b) \( \frac{9}{4} \)
(c) \( 9 \)
(d) \( \frac{3}{2} \)
(e) \( 0 \)

11. Find the equation of a circle with center \((5, 1)\) such that the point \((5, 7)\) is on the circle.

**Choices:**

(a) \( (x + 2)^2 + (y + 7)^2 = 4 \)
(b) \( (x - 5)^2 + (y - 1)^2 = 6 \)
(c) \( (x - 2)^2 + (y - 7)^2 = 4 \)
(d) \( (x + 5)^2 + (y + 1)^2 = 49 \)
(e) \( (x - 5)^2 + (y - 1)^2 = 36 \)
12. How many distinct real solutions does the equation \( x^3 - x^2 + 4x - 4 = 0 \) have?

Choices:
(a) Two real solutions.
(b) One real solution.
(c) Four real solutions.
(d) Three real solutions.
(e) No real solutions.

13. Find the \( x \) and \( y \)-intercepts of the graph of
\[
x + y^2 - 4 = 0
\]

Choices:
(a) The \( x \) intercepts are \( x = 2 \) and \( x = -2 \) and the \( y \) intercept is \( y = 4 \).
(b) The \( x \) intercept is \( x = 4 \) and the \( y \) intercept is \( y = 2 \).
(c) The \( x \) intercept is \( x = 4 \) and there are no \( y \) intercepts.
(d) The \( x \) intercept is \( x = 4 \) and the \( y \) intercepts are \( y = 2 \), and \( y = -2 \).
(e) The \( x \) intercept is \( x = -4 \) and the \( y \) intercepts are \( y = 2 \), and \( y = -2 \).

14. Which one of the following statements is not true?

Choices:
(a) \( \sqrt{x^2} = x \) for all real numbers \( x \).
(b) \( |x - y| = |y - x| \) for all real numbers \( x \) and \( y \).
(c) \( a \) has two square roots for all real numbers \( a > 0 \).
(d) \( |a| \) can never be negative for all real numbers \( a \).
(e) \( \sqrt{a^2} = |a| \) for all real numbers \( a \).

15. Which one of the equations represents the statement that the distance from \(-2\) to a number \( x \) on the number line is \( 7 \)?

Choices:
(a) \( |x - 7| = 2 \)
(b) \( |7 + x| = 2 \)
(c) \( |x - 2| = 7 \)
(d) \( |x + 2| = 7 \)
(e) \( |7 - 2| = x \)
16. Solve the equation for $x$. Include all solutions in your answer on the front of the exam.

\[
\frac{1}{x + 1} + \frac{3}{(x + 1)(x + 3)} = \frac{2}{x + 3}
\]

17. Find the center of the circle

\[x^2 - 2x + y^2 + 6y - 10 = 0.\]

18. Solve the equation for $R$.

\[
\frac{1}{R} = \frac{1}{V} + \frac{1}{W}
\]
19. Find all real solutions to the equation $x^4 - 5x^2 + 4 = 0$.

20. Solve for $s$.

\[
\frac{8 - 2s}{5} = 17
\]