CP Algebra 2 Midterm Review – Multiple Choice (40 questions)

Evaluate each expression if \( r = -1, \ n = 3, \ t = 12, \) and \( w = -\frac{1}{2}. \)

1. \(-w[t + (t - r)]\)
2. \(9r^2 + (n^2 - 1)t\)

Solve each equation. Check your solution.

3. \(x + 4 = 5x + 2\)
4. \(a - \frac{2a}{5} = 3\)

Evaluate each expression if \( a = -1, \ b = -8, \ c = 5, \) and \( d = -1.4. \)

5. \(|5a - 7| + |3c - 4|\)
6. \(-|10d + a|\)

Solve each equation. Check your solutions.

7. \(5|2r + 3| - 5 = 0\)
8. \(2|4 - s| = -3s\)
9. \(-2|7 - 3y| - 6 = -14\)
10. \(-2|7 - 3y| - 6 = 14\)

Solve each inequality. Then graph the solution on the number line.

11. \(9(2r - 5) - 3 < 7r - 4\)
12. \(|x - 8| \geq 3\)
13. \(\frac{4x - 3}{2} \geq -3.5\)

14. Determine the \(x\)-intercept and the \(y\)-intercept of the equation and then graph the function.

\[3x - 4y - 6 = 15\]

15. State whether each function is a linear function. Write yes or no.
If yes, identify the slope and \(y\)-intercept. If no, explain why.

a. \(3x + 4y = 12\)  b. \(y = x^3 - 6\)  c. \(f(x) = -2x + 9\)  d. \(\frac{1}{x} + 3y = -5\)

16. Find the slope of the line that passes through each pair of points.

a. \((1, 9), (0, 6)\)  b. \((-2, -2), (10, -2)\)  c. \((-2, 5), (-3, -1)\)  d. \((4, 6), (4, 3)\)

Slope Formula (Must Know this): \(m = \frac{y_2 - y_1}{x_2 - x_1}\)
Determine an equation in slope-intercept form for the linear function with the given characteristics.

17. Parallel to \( y = \frac{2}{3}x + 6 \) 
   passes through point (6,7) 
18. Perpendicular to \( y = -4x + 1 \) 
   passes through point (–8, –1) 
19. Slope \( \frac{5}{6} \), pass through (12,4) 
20. passes through (–1, –2) and (–3,1) 

21. Identify the slope and determine the equation of the line in slope-intercept form.
   a. 
   b. 
   c. 
   d. 

22. Determine the equation of the function that is graphed.
   a. 
   b. 
   c. 

23. Describe the transformation on the parent function. Graph the function.
   State the domain and range of the function.
   a. \( f(x) = \lfloor x + 1 \rfloor + 2 \) 
   b. \( f(x) = 2\lfloor x - 3 \rfloor - 1 \) 
   c. \( g(x) = -2|x + 1| + 3 \) 

24. Write an equation for the given function that undergoes the following transformations.
   a. An absolute value graph (parent function: \( f(x) = |x| \) that is translated to the right 3 and down 2. 
   b. A greatest integer (step function) graph (parent function: \( f(x) = \lfloor x \rfloor \) ) that is reflected over the x-axis, translated 2 down and 3 left.
25. Find the coordinates of the point where the graphs of the functions intersect by using either substitution or elimination.

   a. \(2x - 5y = 10\) 
      \(y = -3x + 15\)
   b. \(x - y = 5\) 
      \(-2x + 2y = -10\)
   c. \(x - 2y = -12\) 
      \(2x + y = 11\)

26. State the constant each equation needs to be multiplied by in order to use the elimination method to eliminate the variable \(y\).

   \[4y + 8x = 8\]
   \[2y + 4x = -4\]

27. Determine the coordinates of the vertices of the feasible region for the system.

   \[y \geq 2x - 2\]
   \[2x + 3y \geq 6\]
   \[y \leq 4\]

28. Choose the system of inequalities graphed below.

   A. \(2x + y \geq 5\) 
      \(3x + 2y \leq 9\)
   B. \(2x + y > -5\) 
      \(3x - 2y \geq 9\)
   C. \(2x - y \leq 5\) 
      \(3x + 2y < 9\)
   D. \(-2x + y > 5\) 
      \(3x - 2y \leq 9\)

29. Determine the inequalities for the system graphed below.

30. Determine the value of the discriminant and describe the number and nature of the roots. Then solve the quadratic equation by factoring, using the quadratic formula, or completing the square.

   a. \(x^2 - 6x + 5 = 0\)
   b. \(4x^2 + 5x - 6 = 0\)
   c. \(x(x - 3) = 10\)
   d. \(5x^2 - x - 1 = 0\)
   e. \(x^2 - 2x - 17 = 0\)
   f. \(x^2 - 4x = 11\)
Determine the equation of the function in standard form with the given roots.

31. $-2, -5$  
32. $\frac{-1}{2}, \frac{3}{4}$

33. Write the quadratic equation $y = x^2 + 6x + 2$ in vertex form. Identify the vertex, axis of symmetry and direction of opening.

34. Determine the axis of symmetry, $y$-intercept, and the coordinates of the vertex. Describe if the graph opens up or down and if it has a maximum or minimum value. Determine the maximum or minimum value of the function.
   a. $y = x^2 - 2x - 5$  
   b. $y = -(x + 3)^2 + 5$

35. Determine the equation of the parabola with vertex at $(-1, 2)$ that passes through $(2, 11)$. Write the answer in vertex form.

36. For each quadratic function, determine the transformation and then graph.
   a. $y = (x + 1)^2 + 2$  
   b. $y = -\frac{1}{2}(x + 2)^2$

37. Determine the equation of the quadratic function graphed below.
   a.  
   b.  

38. Simplify the following.
   a. $i^{21}$  
   b. $i^{97}$  
   c. $i^{216}$  
   d. $i^{81}$  
   e. $(7 - 6i) + (9 + 11i)$  
   f. $(28 - 4i) - (10 - 30i)$  
   g. $(4 + 3i)(2 - 5i)$  
   h. $\frac{6+5i}{-2i}$
39. Solve the inequality.
   a. \( x^2 - 4x \leq 21 \)  
   b. \( x^2 - 14x > -49 \)

40. Simplify. Assume that no variable equals 0.
   a. \( b^4 b^3 \)  
   b. \( c^5 c^2 c^2 d^{-3} \)  
   c. \( x^5 x^{-4} \)
   d. \( (2x)^2 (4y)^2 \)  
   e. \( -2gh(g^3 h^5) \)  
   f. \( \frac{24wz^7}{3w^3 z^5} \)
   g. \( \frac{-6a^4 b c^6}{36a^7 b^2 c} \)  
   h. \( (5d + 5) - (d + 1) \)  
   i. \( (a - 5)^2 \)

41. Simplify.
   a. \( \frac{10c+6}{2} \)  
   b. \( \frac{15y^2+6y^2+3y}{3y} \)  
   c. \( \frac{6k^2 m - 12k^3 m^2 + 9m^3}{2km^2} \)
   d. \( (-6w^3 z^4 - 3w^2 z^5 + 4w + 5z) \div (2w^2 z) \)
   e. \( (b^3 + 27) \div (b + 3) \)
   f. \( (x^4 - 3x^3 - 11x^2 + 3x + 10) \div (x - 5) \)
1. Solve each system of equations.
   a. \(2x + 3y - z = 0\)
      \(x - 2y - 4z = 14\)
      \(3x + y - 8z = 17\)

   b. If \(z = -4\), find the values of \(x\) and \(y\).
      \(x - 4y + 3z = -27\)
      \(3y - 3z = 24\)

2. Solve the word problems by setting up a system of equations.
   a. The sum of the ages of Zelda and her sister Mae is 45. Zelda’s age is three more than twice Mae’s age. How old is each girl? Write a system and solve.

   b. The senior class at High School A and High School B planned separate trips to New York City. The senior class at High School A rented and filled 1 van and 6 buses with 372 students. High School B rented and filled 4 vans and 12 buses with 780 students. Each van and each bus carried the same number of students. How many students can a van carry? How many students can a bus carry?

   c. The Math Honor Society is selling apple pies for $8.50 and pumpkin pies for $9.00 to raise money. You sell a total of 36 pies for $311.50. How many of each pie did you sell?

3. Solve the following equations.
   a. \(0 = 2x^2 + 25x + 50\)
   c. \(-3x^2 + 4x = -8\)
   e. \((x - 6)(x + 2) = 48\)
   b. \(0 = x^2 + 25\)
   d. \(2x^2 + 2x - 12 = 0\)

4. Stephanie launched a cannon ball straight up into the air which is represented by the equation \(h(t) = -16t^2 + 100t + 20\), where \(h(t)\) is the height in feet of the ball \(t\) seconds after it was launched.

   a. What is the maximum height the cannon ball will reach?

   b. How long will it take the cannon ball to reach the ground?
5. Graph each function. Identify the domain and range.

a. \( h(x) = \begin{cases} \frac{x}{3}, & \text{if } x \leq 0 \\ 2x - 6, & \text{if } 0 < x < 2 \\ 1, & \text{if } x \geq 2 \end{cases} \)

b. \( f(x) = \begin{cases} -3, & \text{if } x \leq -1 \\ x + 1, & \text{if } -1 < x \leq 3 \\ x, & \text{if } x > 3 \end{cases} \)

c. \( f(x) = -2|x| + 3 \)

6. The quadratic equation \( f(x) = -x^2 - 6x - 12 \) is written in standard form. Rewrite \( f(x) \) in vertex form and fill out the chart with appropriate information. Finally graph the quadratic equation.

<table>
<thead>
<tr>
<th>Vertex Form</th>
<th>( x ), ( y )</th>
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<tbody>
<tr>
<td>Axis of symmetry</td>
<td></td>
</tr>
<tr>
<td>Vertex</td>
<td>( ( , , ) )</td>
</tr>
<tr>
<td>y-intercept</td>
<td></td>
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<tr>
<td>Open up or down?</td>
<td></td>
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<tr>
<td>Minimum / Maximum</td>
<td></td>
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<tr>
<td>Domain / Range</td>
<td></td>
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7. Solve the quadratic equation \( 3x^2 + 24 = -45 \) using all four methods of solving.

a. Graphing

b. Factoring

c. Quadratic Formula

d. Completing the square