**PART I – INTERMEDIATE ALGEBRA**

**ARITHMETIC**
Put your answer in simplest form; for example, if you get \( \frac{7}{4} \) for an answer, you would change it to \( \frac{1}{2} \).

1. \(-5 + 7\)
2. \(-5 - 7\)
3. \(-5 - (-7)\)
4. \(-5 - 7\)
5. \(\frac{1}{4} + \frac{3}{10}\)
6. \(\frac{1}{3} - \frac{-7}{9}\)
7. \(-7(-1)(-5)\)
8. \(\frac{4}{3} \cdot \frac{5}{6} \cdot \frac{9}{20}\)
9. \(\frac{30}{\sqrt{2}}\)
10. \(\frac{1}{15} - \frac{7}{9}\)
11. \(\frac{5}{4} - \frac{5}{4} - \frac{7}{20}\)
12. \(\frac{10}{12} + \frac{-7}{8}\)
13. \(5(4 - 2)^2 - 9/3 + 5\)
14. \(0/5\)
15. \(\frac{9^2}{2^4}\)
16. \(\sqrt[3]{12345}\)
17. \(\sqrt{9/25}\)
18. \(\sqrt{64 + 36}\)
19. \(\sqrt{10^2 - 8^2}\)
20. \(\sqrt{-32}\)
21. \(1^6/2\)
22. \((-1)^{10} + (-1)^9\)
23. \(\sqrt{48} - \sqrt{8}\)
24. \(-3^2\)
25. \((1.2 \times 10^4) \cdot (0.35 \times 10^{-1})\)

**ALGEBRAIC OPERATIONS**
Perform the indicated operations, then simplify your result; your answer should contain only positive exponents.

1. \((-5x^2y^3z^2)(-2x^3y^2z^{-3})\)
2. \((-2c)^4\)
3. \(\frac{12x^2y^{-3}z^4}{40x^2y^2z^2}\)
4. \((-2x^2 + 3x -2)(x - 5)\)
5. \(\frac{3}{x^2 - 2x} - \frac{2}{x}\)
6. \(\frac{x^2 - 9}{xy + y} + \frac{x + 3}{x}\)
7. \(\sqrt{c^2 + d^2}\)
8. \(\sqrt{9x^2 + 9y^2}\)
9. \((2x^2y - 5xy^2+4y)-(3x^2y - 6xy^2+5xy)\)
10. \((x + y)^2 - (x - y)^2\)
11. \(-x^2 + (-x)^2\)
12. \(4(x - 3) + 9(x - 2) + 5\)
13. \(5(2x - 4) - 2(4 - 7x)\)
14. \(x^2 + 4x - 12\)
15. \((2x - 3y)(2x + 3y)\)
16. \((x - 2) / (2 - x)\)

**SOLVING EQUATIONS AND INEQUALITIES**
Solve for \(x\) in simplest form. (Real number solutions only!)

1. \(4(x - 2) = 8(x + 3)\)
2. \(x^2 + 64 = 0\)
3. \(x^2 - 64 = 0\)
4. \(x^2 - 3x - 10 = 0\)
5. \(3x^2 - 2x - 2 = 0\)
6. \(2x^2 - 3x + 4 = 0\)
7. \(\frac{x + 4}{x - 4} = \frac{x + 2}{x}\)
8. \(\frac{4x - 5}{3x + 7}\)
9. \(x^2(5x + 2)(4x - 1) = 0\)
10. \(-3x + 11 > 32\)
11. \(|x - 3| < 4\)
12. \(|x + 5| > 4\)
13. \(x^2 < 4\)
14. \(4z^2 = 2x + 9\) (solve for \(x\) symbolically)
15. \(\frac{3}{x} - 2\)
16. \(\sqrt{5}\)
17. \(\sqrt{9/25}\)
18. \(\sqrt{64 + 36}\)
19. \(\sqrt{10^2 - 8^2}\)
20. \(\sqrt{-32}\)
21. \(1^6/2\)
22. \((-1)^{10} + (-1)^9\)
23. \(\sqrt{48} - \sqrt{8}\)
24. \(-3^2\)
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**COORDINATES AND GRAPHS**
For questions asking for quadrants, use the numbering below.

1. In what quadrant is each of the following:
   a. \((2, -3)\) b. \((-2, 3)\) c. \((-2, -3)\)
2. Find the slope of the line through \((-5, 2)\) and \((1, -7)\)?
3. Are \(4x + 3y = 7\) and \(12x - 9y = 3\) parallel?
4. Find an equation of the line through \((4, -5)\) that is parallel to the line \(y = \frac{7}{3}x - 1\).
5. Use algebra to find the intersection of the lines:
   \(2x + y = 4\) and \(x + 3y = 7\)
6. What points lie on the graph of: \(x^2 + y^2 = 9\), if \(y = 1\)?
7. \(3x - 4\)
   b. \(\frac{3x + 2y - 6}{2}\)
8. What is the slope of a line that passes through \((-3, 1)\) and \((4, -4)\):
   a. Find the midpoint between the two points.
   b. Find the distance between the two points.
9. What is the equation of a line through \((-5, 2)\) that is perpendicular to the line \(y = \frac{7}{3}x - 1\)?
10. Find the x-intercepts of:
   a. \(y = x^2 - 4x - 12\)
   b. \(y = -x^2 - 4x + 12\)
BASIC FUNCTIONS

1. Consider this graph of \( y = f(x) \):

   ![Graph of y = f(x)]

   a. What is the domain of \( f(x) \)?
   b. What is the range of \( f(x) \)?
   c. What is \( f(0) \)? (approximate)
   d. For what value of \( x \) does \( f(x) = 3 \)? (approximate)

2. What is the domain of:
   a. \( f(x) = \sqrt{x - 3} \)
   b. \( f(x) = \frac{9}{x^2 - 4} \)

3. Let \( f(x) = 4 - x^2 \) and \( g(x) = 2x + 1 \). Find and simplify:
   a. \( f(-3) \)
   b. \( f(2) \)
   c. \( f(g(x)) \)

4. Which graphs below are graphs of functions \( y = f(x) \)?

   ![Graphs of functions]

5. Given this graph of \( y = f(x) \), graph:
   a. \( f(x) + 2 \)
   b. \( f(x - 2) \)

PARABOLAS AND CIRCLES

1. Consider the graph:
   \( y = -x^2 + 3x + 4 \).
   a. Find the \( y \)-intercept.
   b. Find the vertex.
   c. Sketch the graph.

2. How many \( x \)-intercepts does each of the following graphs have?
   (You should not have to graph them!)
   a. \( y = -x^2 + 2x - 3 \)
   b. \( y = x^2 - 2x - 3 \)
   c. \( y = x^2 - 8x + 16 \)
   d. \( y = -x^2 + 3 \)

3. Find an equation of the circle with center \((-1, 4)\) and radius 7.

4. Find the center and radius of \( x^2 - 8x + y^2 + 2y = 32 \).

EXPONENTIALS AND LOGARITHMS

1. Let \( f(x) = \frac{1}{5}(2^x) \). Fill in the following table and use them to sketch the full graph of \( f(x) \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
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<tr>
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<tr>
<td>-1</td>
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</tr>
<tr>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
</tr>
</tbody>
</table>

2. Expand as far as possible via log rules.
   \[ a^3 = \log_b a^3 = \frac{3}{b} \cdot \log_b a \]

3. Rewrite using just one Log.
   \[ \log x - 4\log y - 7\log z = \frac{\log x}{2} \]

4. Find:
   a. \( \log(1/9) \)
   b. \( \log_4(1) \)
   c. \( \log_{10}(52) \)
   d. \( \log_{10}(63^2) \)

5. Between which two consecutive integers is \( \log 198 \) ?

6. Solve for \( t \) in terms of common logs: \( 7^t = 923 \).

7. For positive \( x \) and \( y \), \( \log x \) can also be written as:
   a. \( x/y \)
   b. \( \log x - \log y \)
   c. \( \log(x/y) \)
   d. none of the above

8. Graph the function \( y = 2^{-x} \).

TRIGONOMETRY AND TRIG FUNCTIONS

1. Find each of the following:
   a. \( \cos 240^\circ \)
   b. \( \tan(-45^\circ) \)
   c. \( \sin 150^\circ \)
   d. \( \sec 180^\circ \)

2. a. Convert 12° to radians.
   b. Convert \( \pi/5 \) radians to degrees.

3. Find each of the following:
   a. \( \sin^2 x + \cos^2 x \)
   b. \( \cos 6\pi \)
   c. \( -\sin(3\pi/2) \)

4. Find \( \tan^2 2x \) when \( x = \pi/3 \).

5. Let \( f(x) = -3\sin 2x \).
   a. What is the amplitude?
   b. What is the period?
   c. Graph one full cycle of \( f(x) \) starting from \( x = 0 \).

6. Which one of the three trig. functions \( \sin x, \cos x \) or \( \tan x \) DOES NOT pass through the origin?

7. You need an angle of elevation of 30° to view a bird flying at a height of 1000 feet. What is your distance from the bird?
SOLUTIONS TO PRETEST

INTERMEDIATE ALGEBRA

ARITHMETIC
1.  2  2. -12  3.  2  4.  37  5.  11/20  6.  7/24  7.  10/9  8. -35  9.  ½
10. -10/21  11.  20/3  12.  6/5  13.  22  14.  0  15.  16/81  16.  1  17.  3/5
18.  10  19.  6  20. -2  21.  64  22.  0  23.  24. -9  25.  42

ALGEBRAIC OPERATIONS
1.  10x  7/z 4  2.  16c  12  3.  (3z)^2/(10y)  4.  -2x^3+13x^2-17x+10  5.  (7-2x)/(x^2-2x)  6.  (x-3)/(x+1)
7.  e^x/9  8.  3\sqrt{x^2+y^2}  9.  -x^2y + xy^2 - 5xy + 4y  10.  4xy  11.  0  12.  13x -25  13.  24x-28
14.  (x-2)/(x+6)  15.  4x^2 - 9y^2  16.  -1

SOLVING EQUATIONS AND INEQUALITIES
1.  x = -8  2.  no real solutions  3.  x = -8,8  4.  x = -2,5  5.  x = (1-\sqrt{7})/3, (1+\sqrt{7})/3
6.  no real solutions  7.  x = -4/3  8.  x = 5/4  9.  x = -2/5,0,1/4  10.  x < -7
11.  -1 < x < 7  12.  x < -9 or x > -1  13.  -2 < x < 2  14.  x = 2z^2 - (9/2)

COORDINATES AND GRAPHS
1. (a) IV  (b) II  (c) III  2. (a) (1/2,-3/2)  (b) \sqrt{74}  3. -3/2  4. (a)(b) use graphing calculator*  5. NO  6. y = -(3/2)x + 1
7.  x = 1, y = 2  8. (-\sqrt{8},1), (\sqrt{8},1)  9.  -1/2  10. (a) -2 and 6  (b) -6 and 2

FUNCTIONS AND GRAPHS

BASIC FUNCTIONS
1. (a) [-1,∞)  (b) [0,∞)  (c) 2  (d) 1  2. (a) x ≥ 3  (b) x ≠ -2,2
3. (a) -5  (b) 4 - 4s^2  (c) -4x^2 - 4x + 3  4. only (c)  5. (a)(b) use graphing calculator*, e.g. with f(x) = x^2

PARABOLAS AND CIRCLES
1. (a) 4  (b) -1 and 4  (c) 3/2,25/4  (d) use graphing calculator*  2. (a) none  (b) two  (c) one  (d) two
3.  x^2 + 2x + y^2 -8y = 32  4. center (4,-1)  radius 7

EXPONENTIALS AND LOGARITHMS
1. use graphing calculator*  2. 3\log_a - 4 - 5\log_c  3. \log(x/(y^2z^7))^{1/2}  4. (a) -2  (b) 0  (c) 1  (d) 74
5. 3 and 4  6. \log_923/\log_7  7. (d)  8. use graphing calculator*

TRIGONOMETRY AND TRIG FUNCTIONS
1. (a) -1/2  (b) -1  (c) 1/2  (d) -1  2. (a) π/15 rad  (b) 36°  3. (a) 1  (b)(c) 1  4. -3\sqrt{3}
5. (a) 3  (b) π  (c) use graphing calculator*  6. cosx  7. 2000 feet

* Graphing calculator mentioned here solely as a means of checking your answers for pretest. Calculators of any type are NOT permitted for the placement test itself.