MAT 135

In Class Assignments
1. Simplify each expression:
   \( a) 2 + 3 \times 5 \quad b) 3 + 2(5 - 2) \quad c) 3 \times 4^2 - 2 \times 3^2 \quad d) 30 \div 6 + 4 \div 2 \)

2. \( a) \) Factor 4,356 into the product of prime factors \( b) \) Reduce \( \frac{4,356}{5,148} \) to lowest terms.

3. Translate each statement into an equivalent inequality:
   \( a) \) \( x \) is at least 4 \( b) \) \( x \) is between 0 and 8 \( c) \) \( x \) is no more than 5

4. Which property or properties of the real numbers is illustrated by each expression?
   \( a) \) \( x + 3 = 3 + x \) \( b) \) \( 5 + 0 = 5 \) \( c) \) \( 5 + (-5) = 0 \)
   \( d) \) \( 5x(y) = x(5y) \) \( e) \) \( 3(1) = 3 \) \( f) \) \( 3(x + y) = 3x + 3y \)

5. Write in scientific notation:
   \( a) \) 376,000 \( b) \) 4,520 \( c) \) 0.0000067

6. Write in expanded form:
   \( a) \) 1.94\times10^5 \( b) \) 5.4\times10^{-4} \( c) \) 3.53\times10^3

7. Simplify each expression. Write all answers with positive exponents only. Assume all variables are nonzero.
   \( a) \) \( (x^2 y^5)^3 \) \( b) \) \( (2y^{-2})^3 (5y^4)^3 \) \( c) \) \( \frac{(x^{-4})^3 (x^3)^{-4}}{x^{10}} \)
1. Solve the following equations:

   \[ a) -4a - 8 = -3a + 7 \]
   \[ b) - \frac{5}{3}t + 3 = 23 \]
   \[ c) 7 + 3(x + 2) = 4(x - 1) \]
   \[ d) \frac{1}{2}x + \frac{1}{4} = \frac{1}{3}x + \frac{5}{4} \]
   \[ e) x + (3x + 2) = 26 \]
   \[ f) 2x - 3(3x - 5) = -6 \]

2. The taxi meter was invented in 1891 by Wilhelm Bruhn. Chicago charges $1.80 plus $0.40 per mile for a taxi ride.

   a) If the fare is $6.60, write an equation that shows how the fare is calculated.

   b) How many miles were traveled if the fare was $6.60?

3. In 1992, twice as many people visited their doctor because of a cough than an earache. The total number of doctor’s visits for these two ailments was reported to be 45 million.

   a) Let \( x \) represent the number of earaches reported in 1992. Write an expression for the number of coughs reported in 1992.

   b) Write an equation that related 45 million to the variable \( x \).

   c) How many people visited their doctor in 1992 to report an earache?
1. Solve the inequalities, graph each solution, and write the solution in interval notation:

\[ a) \frac{1}{3}y > 4 \quad b) -12 \leq 2x \]

\[ c) 5x \geq -115 \quad d) 10 - \frac{1}{2}y \leq 36 \]

\[ e) 2(3x + 1) \leq -10 \quad f) l < 3 - 4(3a - 1) \]

2. A store selling art supplies finds that they can sell \( x \) sketch pads each week at a price of \( p \) dollars each according to the formula \( x = 900 - 300p \). What price should they charge if they want to sell:

\( a) \) at least 300 pads each week?

\( b) \) fewer than 525 pads each week?

\( c) \) more than 600 pads each week?

\( d) \) at most 375 pads each week?
1. Solve the following inequalities. Use a line graph and interval notation to write each solution set.

   \[ a) -60 < 20a + 20 < 60 \]
   \[ b) 7x - 5 \leq -2 \text{ or } 3x + 2 > 3 \]
   \[ c) 5 \leq \frac{1}{4}x + 1 < 9 \]
   \[ d) 8 \leq 12 - x \text{ and } \frac{2}{3}x > 1 \]
   \[ e) 3x - 1 > 2x + 4 \text{ or } 5x - 2 < 3x + 4 \]
   \[ f) -2 \leq m - 5 \leq 2 \]

2. A factory’s quality control department randomly selects a sample of 5 lightbulbs to test. In order to meet quality control standards, the lightbulbs in the sample must last an average of at least 950 hours. Four of the selected bulbs lasted 925 hours, 1000 hours, 950 hours, and 900 hours. How many hours must the fifth lightbulb last for the sample to meet quality control standards?

3. A worker earns $12 per hour plus $16 overtime pay for every hour over 40 hours. How many hours of overtime are needed to make between $600 and $800 per week?
MAT135
In-Class Assignment
Section 3.1 The Rectangular Coordinate System

1. Identify the quadrant in which each point is located, and place it on the graph below. Label the axes on the graph.

   a) (1,2)    b) (-1,-2)    c) (5,0)    d) (0,2)
   e) (-5,-5)  f) (1/2,2)    g) (-8,3)   h) (6,-2)

2. The x-axis on the graph below represents number of hours worked and the y-axis represents pay, in dollars. Approximately what is the pay for working 10, 20, 30, and 40 hours? Create a table that displays the data shown on the graph.
1. Find the slope of the line from the given graphs:

![Graph 1](image1.png)  ![Graph 2](image2.png)

2. Find the slope of the line through the given points. Then plot each pair of points and draw the line through them.

   a) (2,1) (4,4)  
   b) (2, -5) (3, -2)  
   c) (1,5) (-4, -5)

3. A line, l, contains the points (3,4) and (-3,1). Give the slope of any line perpendicular to l.

4. Determine if the line through the points (7,2) and (-9,2) and the line through the points (4,-4) and (1, -4) are parallel, perpendicular, or neither.

5. Solve for y: \( \frac{y - b}{x - 0} = m \)
1. Find the slope, x-intercept, and y-intercept of each equation. Sketch the graph using this information.

   \[ a) y = 3x - 2 \quad b) 3x - 2y = 12 \quad c) 4x + 5y = 20 \]

   \[ d) y = \frac{3}{4}x - 2 \quad e) y = -3x + 3 \]

2. Give the slope and y-intercept of \( y = -2 \).

3. For the line \( x = -3 \), sketch the graph, give the slope, and find any intercepts.

4. Find the x- and y-intercepts of the graph of the equation \(-4x = -16\).

5. Find the equation of a line with an x-intercept of (2,0) and a y-intercept of (0,3).

6. In an aerobics class, the instructor tells her students that exercise heart rate is 60\% of the maximum heart rate, where maximum heart rate is 220 minus their age. Determine the equation that gives exercise heart rate, \( E \), in terms of age, \( A \). Find the exercise heart rate of a 22 year old student.
1. Complete the table:

<table>
<thead>
<tr>
<th>Equation</th>
<th>Slope, m</th>
<th>x-intercept</th>
<th>y-intercept</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = -3x + 5$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = 2x$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$4x + 6y = 24$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = 1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$x = 3$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Write each equation in slope-intercept form:

   a) $6x + 4y = 1$ 
   b) $y + 1 = 3(x + 5)$ 
   c) $4x - 3y - 2 = 0$

3. Find the equation of a line with slope -3 that passes through the point (0,7).

4. Find the equation of a line parallel to $y = 5x - 1$ and has x-intercept (4,0).

5. What is the equation of a line perpendicular to the graph of $y = 2x$ and passes through (-2,5)?

6. What is the equation of a line that passes through (2,1) and (1,2)?

7. A salesperson earns a salary of $1500 per month plus a 3% commission of the total monthly sales. Write a linear equation giving the salesperson’s total monthly income $I$ in terms of the sales, $s$. Sketch a graph of the equation, clearly labeling two points on the graph.
1. For each of the following relations, give the domain and range, and state which are functions:

   \[ a) \{(1,3)(2,5)(4,1)\} \quad b) \{(5,-2)(3,-2)(5,-1)\} \quad c) \{(3,1)(5,7)(2,3)\} \]

2. Let \( f(x) = 2x - 5 \) and \( g(x) = x^2 + 3x + 4 \). Evaluate the following:

   \[ a) f(2) \quad b) f(-3) \quad c) g(-2) \quad d) g(0) \quad e) f(2) - g(3) \quad f) g(2t) \quad g) f(3a) \]

3. Graph each function and identify its domain and range:

   \[ a) f(x) = 3x + 1 \quad b) g(x) = |x| + 2 \quad c) f(x) = x^2, x \leq 0 \quad d) g(x) = -2 \]

4. The function \( V(t) = -3300t + 18,000 \) where \( V \) is value and \( t \) is time in years can be used to find the value of a large copy machine during the first 5 years of use.

   \[ a) \text{What is the value of the copies after 3 years and 9 months?} \]
   \[ b) \text{What is the salvage value of the copier if it is replaced after 5 years?} \]
   \[ c) \text{State the domain of this function.} \]
   \[ d) \text{Sketch a graph of this function, clearly labeling values and the axes of the graph.} \]
   \[ e) \text{What is the range of this function?} \]
   \[ f) \text{After how many years will the copier be worth only$10,000?} \]
MAT135  
In-Class Assignment  
Section 4.2 Solving Systems of Linear Equations Algebraically

1. Solve the following systems:

   \[
   \begin{align*}
   a) \quad & \begin{cases} 
   x - y = 4 \\
   -x + 2y = -3 
   \end{cases} \\
   b) \quad & \begin{cases} 
   2a - 5b = 7 \\
   6a - 5b = -3 
   \end{cases} \\
   c) \quad & \begin{cases} 
   -9x + 5y = -9 \\
   -9x - 5y = -9 
   \end{cases} \\
   d) \quad & \begin{cases} 
   2p - 5q = 3 \\
   -4p + 10q = 3 
   \end{cases} \\
   e) \quad & \begin{cases} 
   2a - 3b = -6 \\
   2a - 3b = 8 
   \end{cases} \\
   f) \quad & \begin{cases} 
   3 \left( \frac{x}{5} \right) + y = 1 \\
   \frac{4}{5} x - y = -1 
   \end{cases} \\
   g) \quad & \begin{cases} 
   3x - 4y = 7 \\
   6x - 3y = 5 
   \end{cases}
   \end{align*}
   \]

2. A store sells sheets for either $15 or $30. One month, sales totaled $12,570. If the store sold 563 sheets, how many $15 sheets were sold?

3. The difference of the measures of two complementary angles is 6 degrees. Find the measure of each angle. (Complementary angles add up to 90 degrees).
1. Evaluate each polynomial for the given value of the variable:

   a) \(2x^2 - 7x + 6\) \(x = 2\) \(x = -3\)

   b) \(8x^3 - x^2 - 2\) \(x = 1\) \(x = 0\)

2. Add or subtract as indicated:

   a) Subtract \(6a^4 - 9a^3 - 2a^2 + 5a - 2\) from \(10a^4 - 12a^3 - a + 7\)

   b) Add \(3a^4 - 7a^3 + a^2 + 8a - 10\), \(8a^3 - 1\), and \(10 - 9a - 7a^2 + a^4\).

   c) \((3x - 5) - (3x - 5)\)

   d) \(6a - (\{2a - 6\{2a + 3(a - 1) - 6\})\}

   e) \((11x^2 + 3xy + 2y^2) + (9x^2 - 2xy + y^2) + (-6x^2 - 3xy + 5y^2)\)

   f) \((2m^2n^2 - mn + 7) - (mn - 3) + (m^2n^2 + 7)\)

3. The calculated annual fixed cost (in dollars) of owning and operating an automobile is given by the polynomial \(20x^2 + 45x + 5400\), where \(x\) is the number of years after 1999. The variable costs are represented by the polynomial \(-75x^3 + 220x^2 + 108x + 1550\). Find a polynomial that represents the difference between the fixed cost and the variable cost for a given year.
1. Multiply as indicated:

   a) \(2x(6x^2 - 5x + 4)\)

   b) \(2a^2b(a^3 - ab + b^3)\)

   c) \((x + 4)(x + 6)\)

   d) \((2x^2 - 3)(3x^2 - 5)\)

   e) \((2x + y)(4x^2 - 2xy + y^2)\)

   f) \((5 - 3t)(4 + 2t)\)

   g) \((4x + 1)^2\)

   h) \(3(x - 1)(x - 2)(x - 3)\)

   i) \((b^2 + 1)(a^4 - 5)\)

   j) \((3t - 10)(3t + 10)\)

   k) \((q + \frac{1}{2}p)^2\)

2. For (a) and (b) below, find \(f(x) \cdot g(x)\), \(f(a+2)\), and \(g(x+1) - g(x)\):

   a) \(f(x) = 3x^2 - 2\) and \(g(x) = 2x^2 - 1\)

   b) \(f(x) = x^2 + 2x - 2\) and \(g(x) = 2x^2 - 3x\)
1. Divide as indicated:

\[ a) \frac{12m^4 - 15m^3}{3m} \]
\[ b) \frac{9y^6 - 3y^5 - 2y^4}{-3y^4} \]

\[ c) \frac{20a^2b + 4ab^3}{8ab} \]
\[ d) \frac{6x^2y^3 - 18x^3y^4 + 9x^4y^5}{6x^2y^3} \]

\[ e) \frac{x^2 + 2x + 7}{x - 2} \]
\[ f) \frac{10x^2 - 2x}{x + 3} \]

\[ g) (56x^2 - 23x + 2) \div (8x - 1) \]
\[ h) (x^2 - 6x - 40) \div (x - 10) \]
\[ i) (x^4 - 25) \div (x^2 + 5) \]

2. Find \( \frac{f(x)}{g(x)} \):

\[ a) f(x) = x^2 - 5x - 24; g(x) = x - 8 \]
\[ b) f(x) = y^4 - 16; g(x) = y - 2 \]
\[ c) f(x) = x^3 + 8; g(x) = x + 2 \]

3. To find the average cost of producing an item, divide the total cost by the number of items produced. A company that manufactures computer disks uses the function \( C(x) = 200 + 2x \) to represent the cost of producing \( x \) disks.

\[ a) \] Find the average cost.
\[ b) \] What happens to the average cost as more items are produced? Hint: Set up a table.
MAT135
In-Class Assignment
Section 5.4 GCF and Factoring by Grouping

1. Factor out the greatest common factor:

   a) $4x^3 - 16x^2 - 20x$
   b) $-x^2y + xy^2 - x^2y^2$

   c) $5x(a - 2b) - 3y(a - 2b)$
   d) $10x^3(2x - 3y) - 15x^2(2x - 3y)$

   e) $20a^2b^2c^2 - 30ab^2c + 25a^2bc^2$
   f) $ax - x^2 - bx + ab$

   g) $9x^3 + 18x^2 - 4x - 8$
   h) $2y(x - 2) + 3(2 - x)$

2. Solve for $P$:

   $TM = PC + PL$

3. In a polygon with $n$ sides, the interior angles, measured in degrees, add up to $180n - 360$.
   Find an equivalent expression by factoring out the GCF.

4. The area (in square meters) of a pool is given by the expression $A = l^2 - 30l$, where $l$
   is the length of the pool.

   a) Factor the expression for the area.
   b) The width of this pool is 20 m. What is the length?
1. Factor:

\[ a) y^2 + y - 6 \quad b) 3a^2 - 3a - 6 \]
\[ c) 2x^3 - 14x^2 + 20x \quad d) x^2 + 10xb + 25b^2 \]
\[ e) m^2 - 8mn - 9n^2 \quad f) 2 + 7a + 6a^2 \]
\[ g) 6x^4 - x^3 - 2x^2 \quad h) 60p^3 + 28p^2q - 16pq^2 \]
\[ i) -21x^2 + 70xy - 49y^2 \quad j) 2x^2(x + 5) + 7x(x + 5) = 6(x + 5) \]

2. Find the missing factor:

\[ a) 12 + 8x + x^2 = ( \quad )(6 + x) \]
\[ b) x^2 - 2xa - 48a^2 = (x + 6a)( \quad ) \]
\[ c) 2x^2 - x - 15 = (x - 3)( \quad ) \]

3. Factor, if possible:

\[ a) 12y^2 + 17xy + 2y^2 \quad b) 9a^2 - 6a + 1 \]
\[ c) 2x^3 - 4x^2 - 96x \quad d) x^2 - 5xb + 6b^2 \]
\[ e) m^2 - mn - 2n^2 \quad f) 9 - 6a + a^2 \]
\[ g) t^2 + 6t - 8 \]
MAT135  
In-Class Assignment  
Section 5.6 Special Factoring

1. Factor, if possible:

   a) $25 - 10t + t^2$
   b) $x^2 - 100$
   c) $x^4 - 81$
   d) $(x - 2)^2 - 9$
   e) $a^3 - 8$
   f) $36 - 60x + 25x^2$
   g) $x^4 - 144y^2$
   h) $27m^3 - 36m^2 + 12m$
   i) $16(x - y) - a^2(x - y)$
   j) $50xy - 18x^3y$
   k) $9x^3y^2 - 81$
   l) $9a^2 - 12ab - 4b^2$
   m) $9 + 60pq + 100p^2q^2$

2. The volume of a box can be modeled by the polynomial $72x - 24x^2 + 2x^3$. Factor this expression completely.
1. Solve each equation:

   a) \(9t^2 - 12t = 0\)
   b) \(3x^2 - x - 4 = 0\)
   c) \(16x^3 = 25x\)
   d) \(800x = 100x^2\)
   e) \((x + 1)^2 = 3x + 7\)
   f) \(2x^2 - 5x - 3 = 0\)
   g) \(4x^2 + 6x = -2\)
   h) \(2n(n + 7) = -24\)
   i) \((n + 2)(n + 4) = 12n\)
   j) \(x^2 + 8x + 12 = 0\)

2. Find all values such that \(f(x) = g(x)\):

   a) \(f(x) = 10v^2 + 35v; g(x) = 20\)
   b) \(f(x) = 4y^2 - y; g(x) = 1 - y\)
   c) \(f(x) = t^2 - 18; g(x) = 3t\)

3. A ball is dropped from a balloon 900 feet above the ground. The height, \(h\), of the ball above the ground (in feet) after \(t\) seconds is given by the equation \(h = 900 - 16t^2\). When will the ball hit the ground?
MAT135
In-Class Assignment
Section 6.1 Multiplication and Division of Rational Expressions

1. Identify the values for which the given expression is undefined:
   \[ a) \frac{x^2 + 2x + 1}{5} \quad b) \frac{3t - 2}{6t - 3} \]

2. Perform the indicated operation and express the answers in lowest terms:
   \[ a) \frac{x^2 - 9}{x^2 - 4} \cdot \frac{x - 2}{x - 3} \quad b) \frac{x^2 + 5x + 1}{4x - 4} \cdot \frac{x - 1}{x^2 + 5x + 1} \]
   \[ c) \frac{p^2 - q^2}{p^2 - pq} \cdot \frac{q}{p^2 - pq - q^2} \cdot \frac{6p + 3q}{p} \]
   \[ d) \frac{a^2 + 7a + 12}{a - 5} \div \frac{a^2 + 9a + 18}{a^2 - 7a + 10} \]
   \[ e) \frac{4t^2 - 1}{6t^2 + t - 2} \div \frac{8t^3 + 1}{27t^3 + 8} \]
   \[ f) \frac{12a^2b - 3ab^2 - 42b^3}{9a^2 - 36b^2} \cdot \frac{6a^2 - 15ab + 6b^2}{8a^3b - b^4} \]
   \[ g) \frac{a^2 - 16b^2}{a^2 - 8ab + 16b^2} \cdot \frac{a^2 - 9ab + 20b^2}{a^2 - 7ab + 12b^2} \div \frac{a^2 - 25b^2}{a^2 - 6ab + 9b^2} \]

2. For \( f(x) \) and \( g(x) \), find \( f(x) \cdot g(x) \) and \( \frac{f(x)}{g(x)} \):
   \[ a) f(x) = \frac{y - 1}{y^2 - y - 6}; \quad g(x) = \frac{y^2 + 5y + 6}{y^2 - 1} \]
   \[ b) f(x) = \frac{m^2 - 7m + 12}{m + 3}; \quad g(x) = \frac{9 - m^2}{m - 4} \]
1. Perform the indicated operation and simplify where possible:

\[ a) \frac{8}{x+3} - \frac{2}{x+3} \]
\[ b) \frac{5}{p+q} + \frac{7}{q+p} \]
\[ c) \frac{3n}{4n+4} + \frac{2n}{n^2-1} \]
\[ d) \frac{4x+2}{3x+12} - \frac{x-2}{x+4} \]
\[ e) \frac{1}{2y-3} - \frac{18y}{8y^3-27} \]
\[ f) \frac{2x-8}{3x^2+8x+4} + \frac{x+3}{3x^2+5x+2} \]
\[ g) \frac{6x+1}{2x+1} + \frac{x}{x-1} - \frac{4x}{2x^2-x-1} \]
\[ h) \frac{y}{8y-16} + \frac{3y+4}{y-2} - \frac{y-3}{(y-2)^2} \]

2. Given \( f(x) \) and \( g(x) \), \( f(x) + g(x) \) and \( f(x) - g(x) \):

\[ a) f(x) = \frac{9}{9x^2+6x-8}; g(x) = \frac{6}{9x^2-4} \]
\[ b) f(x) = \frac{1}{a+b}; g(x) = \frac{3ab}{a^3+b^3} \]

3. The formula \( P = \frac{1}{a} + \frac{1}{b} \) is used by optometrists to determine how strong to make eyeglasses. If \( a = 10 \) and \( b = 0.2 \), find the value of \( P \).

4. Write an expression for the sum of the reciprocals of two consecutive integers and simplify it.
1. Solve the following equations:

   a) \[ \frac{5}{2x} = \frac{2}{x} - \frac{1}{12} \]
   
   b) \[ \frac{2x}{x-3} + 2 = \frac{2}{x-3} \]

   c) \[ \frac{2}{x-3} + \frac{x}{x^2-9} = \frac{4}{x+3} \]
   
   d) \[ \frac{y+2}{y^2-y} - \frac{6}{y^2-1} = 0 \]

   e) \[ \frac{n+1}{n^2+2n-3} = \frac{n}{n+3} - \frac{1}{n-1} \]

2. If \( f(x) = \frac{4}{x+1} \), find all values for which \( f(x) = 3 \).

3. Solve for \( V_2 \) \[ \frac{p_1V_1}{T_1} = \frac{p_2V_2}{T_2} \]

4. If \( f(t) = \frac{1}{t^2-1} \) and \( g(t) = \frac{3}{t+1} \), find all values for which \( f(t) = g(t) \).

5. At a warehouse, it takes two employees \( 1 \frac{1}{3} \) hours to load a truck when they work together. If it takes one employee working alone 3 hours to load a truck, how long does it take the other employee working alone?
MAT135
In-Class Assignment
Section 7.1 Radical Expressions and Radical Exponents

1. Find the value of each root:
   \[ a) \sqrt[3]{144} \quad b) \sqrt[3]{-100} \quad c) \sqrt[3]{0.04} \quad d) \sqrt[3]{27} \]

2. Simplify each expression:
   \[ a) \sqrt[6]{49a^{10}} \quad b) \sqrt[3]{32x^6 y^{10}} \]
   \[ c) \sqrt{(x+2)^2} \quad d) \sqrt[3]{8a^{15}} \]
   \[ e) 32^{\frac{1}{5}} \quad f) \left( \frac{81}{25} \right)^{\frac{1}{2}} \]
   \[ g) (x^5 y^5)^{\frac{3}{8}} \quad h) \left( \frac{16}{81y^4} \right)^{\frac{3}{4}} \]
   \[ i) (t^{\frac{4}{5}})^{10} \quad j) \frac{p^{\frac{5}{6}}}{7 p^{\frac{2}{3}}} \]

2. The time, \( t \), it takes in seconds for an object to fall \( d \) feet is given by the equation \( t = \frac{1}{4} \sqrt{d} \).
   a) The Sears Tower in Chicago is 1450 feet tall. How long would it take a penny to fall from the ground from the top of the Sears Tower?
MAT135
In-Class Assignment
Section 7.2 Simplifying Radical Expressions

1. Write each of the expressions in simplified form:

   a. \( \sqrt{24} \)
   b. \( \sqrt{27} \)
   c. \( \sqrt[4]{40x^4y^7} \)
   d. \( \sqrt[4]{48a^2b^3c^5} \)
   e. \( \frac{\sqrt[5]{54xy}}{\sqrt[6]{6y}} \)
   f. \( \sqrt[8]{4y^4} \)
   g. \( \sqrt[5]{\frac{p^2}{32q^5r^{10}}} \)

2. Find the distance between (-5,4) and (3,-3).

3. Evaluate and simplify \( \sqrt{b^2-4ac} \) if \( a = 2, \ b = -6, \) and \( c = 3 \).

4. Show that \( \sqrt{a+b} = \sqrt{a} + \sqrt{b} \) is not true by using \( a = 9 \) and \( b = 16 \) and simplifying both sides.

5. The length of a diagonal of a rectangular box with length \( l \), width \( w \), and height \( h \) is given by \( d = \sqrt{l^2 + w^2 + h^2} \). Find the length of the diagonal of a rectangular box that is 3 feet wide, 4 feet long, and 12 feet high.

6. Simplify \( \sqrt{x^2-16x+64} \)
MAT135
In-Class Assignment
Section 7.3 Addition and Subtraction of Radical Expressions

1. Combine the following expressions, if possible. Assume that any variables under an even root are nonnegative.

a. $4\sqrt{3} - 2\sqrt{3}$

b. $6y\sqrt{a} - 2y\sqrt{a}$

c. $5x\sqrt{6} - 3x\sqrt{6} - 2x\sqrt{6}$

d. $5\sqrt[3]{16} - 4\sqrt[3]{54}$

e. $5\sqrt{y} - 2\sqrt[3]{y}$

f. $\sqrt[3]{x^4y^2} + 7x\sqrt[3]{xy^2}$

g. $2\sqrt[6]{x^8y^6} - 3y^2\sqrt[8]{8x^8}$

h. $5a^2\sqrt[3]{27ab^3} - 6b\sqrt[3]{12a^5b}$

i. $\sqrt[3]{-27r^6} - 4r\sqrt[3]{64r^3}$

j. $\frac{1}{2}\sqrt{128} + \frac{1}{3}\sqrt{225}$

2. Find $f(x) + g(x)$ and $f(x) - g(x)$:

a. $f(x) = \sqrt[3]{81}$ and $g(x) = \sqrt[3]{75}$

b. $f(x) = \sqrt[3]{20a^2b^3}$ and $g(x) = \sqrt[3]{45a^3}$

3. The ramp shown at the right has a base, $b$, of 8 feet and a height, $h$, of 4 feet. The length of the ramp is given by $\sqrt{b^2 + h^2}$. Find the length of the ramp.
MAT135
In-Class Assignment
Section 7.4 Multiplication and Division of Radical Expressions

1. Multiply or divide as indicated and simplify. Assume that any variables under an even root are nonnegative.

   a. \(2\sqrt{3} \quad 5\sqrt{7}\)

   b. \(3\sqrt{3} \quad 6\sqrt{9}\)

   c. \(\sqrt{x+5} \quad \sqrt{x-3}\)

   d. \(\sqrt{x-3}^2\)

   e. \(2\sqrt{a} - 3\sqrt{b}^2\)

   f. \(\sqrt{v} + 7 \quad \sqrt{v} - 7\)

   g. \(5 - \sqrt{v} \quad 5 + \sqrt{v}\)

   h. \(\frac{\sqrt{x}}{\sqrt{x-3}}\)

   i. \(\frac{\sqrt[4]{9b}}{6\sqrt{a}}\)

   j. \(\frac{6}{2 + \sqrt{2a}}\) (rationalize the denominator)

2. Find \(f(x) \cdot g(x)\) and \(\frac{f(x)}{g(x)}\) if \(f(x) = \sqrt{x} - 1\) and \(g(x) = \sqrt{x} + 3\).
MAT135
In-Class Assignment
Section 7.6  Complex Numbers

1. Simplify the following as much as possible:

   a) \( \sqrt{-36} \)

   b) \( \sqrt{-49} \)

   c) \( \sqrt{-48} \)

   d) \( \sqrt{-12} \)

   e) \( \sqrt{-65} \)

   f) \( \sqrt{\frac{-9}{49}} \)

   g) \( \sqrt{\frac{-24}{49}} \)

   h) \( -\sqrt{\frac{9}{4}} \)

   i) \( -\sqrt{-72} \)

   j) \( -6\sqrt{-48} \)

2. \((3+4i)+(2-i)=\)

3. \((4-9i)(3+i)=\)

4. \(\frac{4}{4-i}=\)
1. Solve by completing the square:
   
   a) \( x^2 + 2x - 8 = 0 \)
   b) \( x^2 - 4x + 3 = 0 \)
   c) \( 3x^2 - 9x - 12 = 0 \)
   d) \( m^2 - 7m + 3 = 0 \)
   e) \( 3t^2 - 6t = 1 \)
   f) \( 2x^2 - 4x - 8 = 0 \)
   g) \( 4x^2 - 3x + 5 = 0 \)

2. Given \( f(x) \) and \( g(x) \), find all values for which \( f(x) = g(x) \):
   
   a) \( f(x) = 2x^2 + 7x; \ g(x) = 6x - 8 \)
   b) \( f(x) = 3x^2 - x; \ g(x) = x - 15 \)

3. A rectangle is 4 feet longer than it is wide, and its area is 20 square feet. Find the dimensions of the rectangle, to the nearest tenth of a foot.

4. If the lengths of the shorter sides of a right triangle are both \( x \), find the length of the hypotenuse, in terms of \( x \). What are the measures of the angles in this triangle?
1. Solve using the quadratic formula:

   \( a)3x^2 - 4x - 2 = 0 \)
   \( b)3x^2 + 6x + 2 = 0 \)
   \( c)\frac{r^2}{4} = \frac{2r}{5} + \frac{1}{10} \)
   \( d)m^2 + 4m + 1 = 0 \)
   \( e)2t^2 - t = 3t \)
   \( f) - x^2 + 10x = 18 \)
   \( g)x^2 - \frac{5x}{3} = -\frac{x}{3} \)

2. Use the discriminant to determine the number and types of solutions for each of the following equations:
   \( a)2x^2 - 4x = 3 \)
   \( b)2x^2 - 1 = 6x \)
   \( c)\frac{r^2}{2} + \frac{5r}{2} = -1 \)
   \( d)x^2 - 6m + 10 = 0 \)
   \( e)3t^2 - 6t = 1 \)

3. A woman invests $1,000 in a fund. Interest is compounded annually at a rate \( r \). After one year, she deposits an additional $2,000. After two years, the balance in the account is $3,368.10. This is calculated as follows:

   \[ 3,368.10 = 1,000(1 + r)^2 + 2,000(1 + r) \]

Find the rate, \( r \).
MAT135
In-Class Assignment
Section 8.4 Graphing Quadratic Functions

1. Answer the following questions for the graph shown:

   a) What are the x-intercepts of the graph?
   b) What is the y-intercept?
   c) What is the axis of symmetry?
   d) What is the vertex?
   e) What is the domain and range?

2. For the following functions, find the x-intercepts, y-intercept, axis of symmetry, vertex, determine if the graph opens upward or downward, and find any maximum or minimum values. A sketch of the graph is helpful.

   a) \( y = -x^2 + 6x - 5 \)
   b) \( y = x^2 + 4x + 4 \)
   c) \( f(x) = 2x^2 - 4x \)
   d) \( f(x) = 4x^2 - 12x + 9 \)
Some problems in this packet have been taken from or adapted from the following texts:


Akst and Bragg, *Intermediate Algebra Through Applications*
