1. Consider the linear equation:  \( 4x + 3y - 15 = 0 \)
   a. Put the equation in slope intercept form
   b. State the slope
   c. State the coordinate of the y-intercept
   d. Give the exact coordinate for the x-intercept
   e. Graph the line

2. Find the equation of a line passing through points:  
   \((-5, 4) \& (5, 8)\)

3. Consider the data in the chart concerning the weight of channel iron

<table>
<thead>
<tr>
<th>Channel iron lengths and weights chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (x) 19 feet 23 feet 37 feet 44 feet</td>
</tr>
<tr>
<td>Weight (y) 152 lbs 196 lbs 336 lbs 408 lbs</td>
</tr>
</tbody>
</table>

   a. Find a linear model for the relationship by hand using the longest and shortest lengths.
   b. Use the regression function in your calculator to find a linear model (equation) for the relationship between length (x) and weight (y).
   c. Use the regression equation to predict the weight of a 62 foot length of channel iron.
   d. Use the regression equation to predict the length of channel iron weighing 784 lbs.

4. Solve the equation:  \( 6.2(2x - 7) + 10.24 = 9 - 4(3x - 4.1) \)

5. Solve the equation:  \( 3x - 2 = \frac{2}{5} - \frac{5x - 2}{4} \)

6. Find the equation for the circle in standard form.

7. Change the equation of the circle to standard form:  \( x^2 + y^2 - 8x + 14y + 29 = 0 \)
8. Find the equation for the ellipse in standard form.

9. Find exact zeros for the function \( f(x) = x^3 - x^2 - 22x - 8 \)

10. Solve (rounded to 2 decimal places): \( 12 - 4\ln(x-3) = 5 \)

11. Calculate the interest rate necessary for $760 to grow to $980 in 4 years compounded continuously.
   Use the compound interest formula: \( A = Pe^{rt} \), where \( A \) = final amount, \( P \) = starting amount, \( r \) = interest rate, and \( t \) = time in years.

12. Solve the system by substitution:
    \[
    y = 2x^2 - 3x + 4 \\
    7x - y = 8
    \]

13. A river flows at 384 cfs at 6:00 am, then at 786 cfs at 11:00 am. Use the exponential function:
    \( A = A_0e^{kt} \), where \( A \) = final amount, \( A_0 \) = initial amount, \( k \) = rate of change and \( t \) = time in hours. Find a function for \( A(t) \) and use it to find the time the river will reach 1200 cfs.

14. Solve the system by elimination:
    \[
    -2x - 3y + 5z = 13 \\
    4x - 2y - 6z = 2 \\
    3x + 4y - z = 1
    \]

Solutions:
1. a. \( y = \frac{4}{3}x + 5 \)   b. \( -\frac{4}{3} \)   c. (0,5)   d. \( \left(3, \frac{3}{4}, 0 \right) \)   e. 

2. \( y = \frac{2}{5}x + 6 \)   3. a. \( y = 10.24x - 42.56 \) b. \( y = 10.18x - 39.98 \) c. 591 lbs. d. 81 feet 4. \( x = 2.4 \)   5. \( \frac{58}{85} \)

6. \( (x + 4)^2 + (y + 3)^2 = 49 \)   7. \( (x - 4)^2 + (y + 7)^2 = 36 \)   8. \( \frac{(x-6)^2}{49} + \frac{(y-2)^2}{81} = 1 \)   9. \( x = -4 \& \frac{5\pm\sqrt{33}}{2} \)

10. \( x \approx 8.75 \)   11. \( r \approx 6.4\% \)   12. (2,6) & (3,13)   13. \( A(t) = 384e^{\frac{343t}{t}} \) t \( \approx 7.97 \) or 1:58 pm   14. (4,-2,3)
Material from math 112

1. Sketch a right triangle or use a Pythagorean identity to find the exact value for \( \tan \theta \) if \( \sin \theta = -\frac{6}{9} \) in quadrant III.

2. Use the unit circle to find both exact values for \( \theta \) between 0 and \( 2\pi \) if \( \cos \theta = -\frac{\sqrt{3}}{2} \) in radians.

3. Use a sketch of a right triangle to find the exact value for \( \csc \left( \cot^{-1} \frac{12}{5} \right) \).

4. Find a sine equation for the graph. (each square is 1 unit)
   Recall that if \( y = a \sin \left[ b(x + c) \right] + d; \)
   \( a = \) amplitude, \( \frac{2\pi}{b} = \) period, \( c = \) phase shift, and \( d = \) vertical shift.

5. \( \tan \theta = \left( -\frac{15}{8} \right) \) in the 2\(^{nd} \) quadrant , find the exact value: \( \sin (2\theta) \)

6. Verify the identity: \( \frac{\cos^2 \theta - \sin^2 \theta}{\cos \theta} = \sin \theta (\cot \theta - \tan \theta) \)

7. Simplify the expression:\( \frac{\sec x \cot^2 x}{\csc x \cos^2 x + \sin x} \)

8. Solve the equation for all values between 0 and \( 2\pi \): \( 2 \cos \theta = 4 \sin \theta \cos \theta \)

9. Change the rectangular coordinate to a polar coordinate \((9,-4) \) \( 0 < \theta < 360^\circ \)

10. Given that \( x = (\cos \theta)t \) & \( y = (\sin \theta)t - 16t^2 + h \); where \( t \) is the time in seconds, \( h \) is the arrow's initial height in feet and \( v \) is the arrow's initial velocity in feet per second.
    Find parametric equations to model the flight of an arrow shot 6 feet off the ground at 186 ft/sec at an angle of 32\(^{\circ} \) from the horizontal in order to find the distance it will travel before hitting the ground.

11. Solve the triangle: \( a = 12, b = 23, c = 28 \)

12. Consider force vectors \( u \) & \( v \) acting on the same point. Find the resultant magnitude and angle \( \Theta \).
   \( ||u|| = 340 \) pounds, \( \Theta = 26^\circ \)
   \( ||v|| = 180 \) pounds, \( \Theta = 258^\circ \)

Solutions:
1. \( \frac{2\sqrt{5}}{5} \) 2. \( \frac{5\pi}{6}, \frac{7\pi}{6} \) 3. \( \frac{13}{5} \) 4. \( y = 5\sin \frac{\pi}{6}(x + 4) + 7 \) 5. \( -\frac{240}{289} \) 6. many answers 7. \( \cot x \)
8. \( \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6} \) 9. \((9.8, 336^\circ)\) 10. \( x = 157.74t \) & \( y = 98.56t - 16t^2 + 6 \); approximately 981 feet
11. \( A = 24.8^\circ, B = 53.6^\circ, C = 101.6^\circ \) 12. \( ||r|| = 269.5 \) lbs., \( \Theta = 354.2^\circ \)