1. Find the union and intersection of each pair of intervals.
   (a) \([-3, 7]\) and \((5, 16)\);
   (b) \((\infty, 1]\) and \([-2, 6)\);
   (c) \((-7, 2]\) and \((-5, 3)\).

2. Convert the following decimals to fractions. You do not need to reduce fractions to lowest form to receive full credit.
   (a) \(x = 0.145145145\ldots\)
   (b) \(x = 1.89999999\ldots\)
   (c) \(x = 3.4292929\ldots\)

3. Answer the following questions about lines:
   (a) Find an equation of the line perpendicular to the line \(y = 3x + 5\) that passes through the point \((4, 1)\).
   (b) Find an equation of the line parallel to the line \(y = 4x - 1\) that passes through the point \((3, 2)\).
   (c) Find an equation of the line passing through the points \((2, 1)\) and \((8, 4)\).

4. Find the distance constant and foci of the following two ellipses:
   (a) \(\frac{x^2}{9} + \frac{y^2}{16} = 1\)
   (b) \(9x^2 + y^2 = 81\)

5. Graph the ellipse given by
   \[
   \frac{(x - 2)^2}{16} + \frac{(y + 1)^2}{9} = 1
   \]
   Label the foci of the ellipse and give its distance constant.

6. (Circles) Find the center, circumference, and area of each of the following two circles:
   (a) \(x^2 + 6x + y^2 + 2y = 6\)
   (b) \(2x^2 + 8x + 2y^2 + 16y = 32\)

7. The height \((y, \text{ in meters})\) of a ball thrown into the air is given by the following function of time \((t, \text{ in seconds})\):
   \[y = -4t^2 + 8t + 8\]
   (a) Find the maximum height of the ball.
   (b) How long will it take for the ball to hit the ground?

8. Find the vertex of each of the following two parabolas.
   (a) \(y = x^2 - 6x + 10\)
   (b) \(y = -x^2 + 14x + 40\)

9. For the following rational functions, identify the domain as well as any holes, vertical asymptotes, and horizontal asymptotes.
   (a) \(\frac{x^2 - 4x + 3}{x^2 - 9}\)
   (b) \(\frac{x^3 + 4x^2 + 5x + 2}{x^2 + 2x + 1}\)
10. Evaluate the following.
   (a) $8^{2/3}$
   (b) $4^{3/2}$
   (c) $-125^{2/3}$

11. Reduce the following.
   (a) $\frac{(x^3y^{-2})^{-4}}{(x^{-7}y^9)^{-1/3}}$
   (b) $\frac{(x^{-10}y^{-7})^2}{(x6y^{10})^{-3}}$

12. Express as a complex number (i.e., in the form $a + bi$).
   (a) $\frac{3-2i}{1+i}$
   (b) $\frac{6-i}{3-2i}$

13. You plan to invest $100 for 5 years. Write an expression for how much will you have at the end of 5 years if the interest is 5% compounded:
   (a) annually;
   (b) monthly;
   (c) continuously

14. You receive payments each year from a settlement. After the first year’s payment of $1,000, payments grow by 4% annual interest. How much will you have been paid after 20 years?

15. A bacterial colony triples in size every 24 hours. How old is the colony if it is 5 times its original size?

16. A substance has a half-life of 1,000 years. If you find .34% of the original amount remaining in a sample, how old is the sample?

17. Graph the following functions:
   (a) $y = -2x^2(x - 1)(x + 3)^2$
   (b) $y = 3x^3 - 6x^2 + 3x - 6$
   (c) $y = 2 \left( \frac{1}{2} \right)^{-x-2} + 5$
   (d) $y = 4e^{-(x+3)} - 4$
   (e) $y = 5 \left( \frac{1}{12,369} \right)^{-(x-1)} + 3$

18. Solve the following equations for $t$:
   (a) $5 = 6e^{2t}$
   (b) $6 = \frac{1}{2}3^{-(t-4)} + 2$
   (c) $1 = 5(\sqrt{3})^t - 1$
Trig Questions

1) Find length of arc spanned by \(300^\circ\) on a circle w/ radius 2.
2) \(\sin \theta = \frac{3}{8}\), find \(\cos \theta + \tan \theta\).
3) What is \(\sin(6002\pi)\)?
4) What is \(\cos(6132\pi)\)?

5) [Diagram of a triangle with sides 6 and 5 and an angle of 30°] What is the area of the triangle?

6) a) Find \(\tan(300^\circ)\)
   b) Find \(\tan(11\frac{7}{8}^\circ)\)

7) Is there a solution for \(3\cos x = \frac{7}{5}\)?

8) What is \(320^\circ\) in radians?

9) \(-8\cos(\frac{6}{4}x)\). What is period & amplitude of this function?

10) \(7\cos(2x+4)\). What is period, amplitude & which direction & by how much does this function shift left or right in comparison to \(7\cos(2x)\)?
11) Find all angles of triangle.

12) Find all unknown angles.

13) a) What is $\tan^{-1}(\sqrt{3})$? 
    b) What is $(\tan^{-1}(\sqrt{3}))^{-1}$?

14) Find the intersections of $y = 3x^2 + \frac{y^2}{4} + \frac{x^2}{9} = 1$.

15) Solve for $x, y, z$:

\[
\begin{align*}
    x + 3y - 2z &= 1 \\
    2x - 4y + 3z &= -5 \\
    -3x + 6y - 4z &= 0
\end{align*}
\]