1. Find all vertical and horizontal asymptotes of \( f(x) = \frac{24 - 20x - 4x^2}{5x^2 - 5} \).

2. \( f(x) \) is an exponential function in which \( f(2) = 6 \) and \( f(3) = 30 \). Find a formula for \( f(x) \).

3. 
   a) \( f(x) = 5(2^x) \) \( \text{Find} \quad f^{-1}(80) \).

   b) \( f(x) = 3 \ln x \) \( \text{Find} \quad f^{-1}(10) \).

4. A bacteria culture grows at a continuous rate. If initially there were 10 g and after 6 hours there were 15 g then
   a) find a formula for the weight at \( t \) hours past the initial time.
   b) find the doubling time.
   c) find the continuous growth rate.

5. A radioactive substance decays continuously so that initially there were 60 g and after 250 years there were 50 g.
   a) Find the formula for the weight \( t \) years past the initial time.
   b) Find the half life.
   c) Find the continuous decay rate.

6. Solve for \( x \) in \( 8^x - 3(4^x) - 2^{x+2} = 0 \).

7. Write \( \log \left[ \frac{x^3(x - 2)^2}{\sqrt{x^5 + 1}} \right] \) as a sum of simpler logs as much as possible.

8. Given the system of linear equations \( 2x + 5y = 1, \ 3x + ky = c \), for what value(s) of \( k \) and \( c \) does the system have
   a) infinitely many solutions?
   b) no solution?
   c) a unique solution?

9. Solve for \( x \) and \( y \) in the linear system \( 5x + 2y = 7, \ 4x - 3y = 24 \).
10. Solve for all \((x, y)\) so that

\[
a) \quad 5x^2 - y^2 - 4x + 16 = 0 \quad \text{and} \quad -2x + y = 1
\]

\[
b) \quad (x, y) \text{ is on the ellipse } \frac{x^2}{4} + \frac{y^2}{9} = 1 \quad \text{and on the circle of radius } 3 \text{ centered at } (2,0).
\]

11. A right triangle has height 2 and hypotenuse 5. If \(t\) is the angle opposite the height, find \(\sin t, \cos t, \tan t, \sec t, \tan(\frac{\pi}{2} - t), \sec(\frac{\pi}{2} - t), \sin 2t, \text{ and } \cos 2t.\)

12. Evaluate each.

\[
a) \quad \tan \left(\frac{11}{12}\pi\right) \quad b) \quad \sec \left(\frac{7}{12}\pi\right)
\]

13. Solve for all \(t\) in \([0, 2\pi]\) for which

\[
a) \quad \tan t = 4 \sin t \quad b) \quad \tan^2 t + \sec^2 t = 7 \quad c) \quad \cos t = \sin(\pi - 2t)
\]

14. Be able to graph an \(x\) or \(y\) shift of each of the functions \(y = \)

\[
a) \quad y = e^t \quad b) \quad y = e^{-t} \quad c) \quad y = \ln t \quad d) \quad y = \sin t \quad e) \quad y = \cos t
\]

\[
f) \quad y = \tan t \quad g) \quad y = \sec t
\]

15. Compare the graphs of \(y = 2\ln t \quad \text{and} \quad y = \ln(t^2).\)