1. Find the quotient and remainder if $f(x)$ is divided by $p(x)$:
   a) $f(x) = 4x^4 + 6x^3 + 3x - 1$ ; $p(x) = 2x^2 + 1$
   b) $f(x) = 8x^4 + 6x^2 - 3x + 1$ ; $p(x) = 2x^2 - x + 2$

2. Find the quotient and remainder if $f(x)$ is divided by $p(x)$:
   a) $f(x) = 3x^3 + 4x^2 - 2x + 1$ ; $p(x) = (x - \frac{2}{3})$
   b) $f(x) = x^3 + 1$ ; $p(x) = (x - 1)$

3. Use the remainder theorem to find $f(c)$ and determine if it is a zero:
   a) $f(x) = x^3 + 2x^2 - 3x - 8$ ; $c = \sqrt{3}$
   b) $f(x) = 3x^4 - x^3 - 21x^2 - 11x + 6$ ; $c = -2$

4. Solve the equation:
   a) $16^{(2x+1)} = 64^{(x+3)}$
   b) $9^{(2x-8)} = 27^{(x-4)}$

5. Sketch the graphs and dash in the asymptotes, show at least 2 points:

   a) $f(x) = 2^x$
   b) $f(x) = -2^x$
   c) $f(x) = 2^x + 1$
   d) $f(x) = 2^{(x-1)}$
   e) $f(x) = 2^{-x}$
   f) $f(x) = 2(2^x)$
6. Suppose that $5000 is deposited in a saving account at the rate of 5.5%, what is the principal after 5 years if:
   a) The rate is compounded monthly
   b) The rate is compounded continuously

7. How much money should be invested now in order to make $15,000 in 10 years if the rate is:
   a) 5% and compounded monthly
   b) 4% and compounded continuously

8. Sketch the graphs and dash in the asymptotes, show at least 2 points:

   a) \( f(x) = e^x \)
   b) \( f(x) = -e^x \)
   c) \( f(x) = e^{-x} \)
   d) \( f(x) = e^x + 2 \)
   e) \( f(x) = e^{(x+1)} - 2 \)
   f) \( f(x) = 2e^x \)

9. Find the zeros of: \( f(x) = 6x^2e^{-x} + 9x^3e^{-x} \)

10. Solve for \( t \) using logarithms with base \( a \): \( A = B a^{t/n} - C \)

11. Express in term of logarithms: \( \log 3 \sqrt[4]{\frac{y^5}{x^4z^6}} \)

12. Express as a one logarithm: \( 2 \log x - \frac{1}{2} \log(x^2y^4) + 3 \log z \)
13. Sketch the graphs and dash in the asymptotes, show at least 2 points:

a) \( f(x) = \log_2 x \)

b) \( f(x) = \log_2 x + 2 \)

c) \( f(x) = \log_2 (-x) + 1 \)

d) \( f(x) = \log_2 (x + 2) \)

e) \( f(x) = \log_2 |x - 1| \)

f) \( f(x) = -\log_2 x \)
14. Solve the equation:

a) \( \log_3 x + \log_3 (2x + 5) = 1 \)

b) \( \ln x - \ln(x - 1) = \ln 4 \)

c) \( \log 5x - \log(2x - 1) = \log 4 \)

d) \( \log_2 (x + 2) - \log_2 x = 1 \)

e) \( \log_2 (x - 3) = \log_2 8 - \log_2 (x - 2) - 4^{\log_4 1} \)

15. Evaluate using the change of base formula (without calculator):

a) \( \frac{\log_3 32}{\log_3 2} \)

b) \( \frac{\log_6 27}{\log_6 3} \)

16. Find the exact solution:

a) \( 3^{2-3x} = 4^{2x-1} \)

b) \( 2^x = 3^{x-1} \)

17. Solve the equation:

a) \( 2 \log 5 + \log x = 2 - \log(x + 3) \)

b) \( \log_3 (x - 3) = 1 + \log_3 (x + 1) \)

c) \( 10^x + 2(10^{-x}) = 3 \)

b) \( 3(3^x) + 9(3^{-x}) - 28 = 0 \)

e) \( e^{2x} + e^x - 2 = 0 \)

18. The number of fish in a certain lake is given by: \( n(t) = 12e^{0.012t} \), where \( t \) in years and \( n \) in millions.

a) What is the fish population in 5 years?

b) What is the doubling time?

19. After 3 years a sample of radon-222 has decayed to 58% of its original amount. If the decay is given as \( m(t) = m_0 e^{-rt} \), what is the half life?

20. The half life of radon-226 is 1600 years. Suppose we have a 22-mg sample and the decay is given as \( m(t) = m_0 e^{-rt} \).

a) How much of the sample will remain after 4000 years?

b) After how long will only 18 mg of the sample remain?

21. The mass \( m(t) \) remaining after \( t \) days from a sample of Thorium\(^{234}\) is given by \( m(t) = m_0 e^{-0.0277t} \), where \( m_0 \) is the initial mass of the substance. Find the half-life of Thorium\(^{234}\).