1. Find the first and second derivatives of
   (a) \((ax + b)x^2\)
   (b) \(ax^b\)
   (c) \(\frac{cx + g}{cx + d}\)
   (d) \(\ln ax\)
   (e) \(ax^2 + bx + c\)
   (f) \(ax^4 + bx^3 + cx + d\)

2. Given the function \(y = 8x^2 + 2\),
   • find the derivative \(\frac{dy}{dx}\).
   • Find \(f'(1)\) and \(f'(\frac{1}{2})\).

3. Given the function \(y = 8x^2 - 2x\),
   • find the derivative \(\frac{dy}{dx}\).
   • Find \(f'(2)\) and \(f'(3)\).

4. Solve the following optimization program
   \[
   \max_x (10x^{\frac{1}{2}} - 4x + 10)
   \]

5. Find the derivative of \(x^4 + 3x^3 - 4x + 1\).

6. Find the derivative of \((6x + 1)(2x^2)\)

7. Find the derivative of \(\frac{x-1}{x+2}\).

8. Find the derivative of \(\frac{x}{x^2 + 1}\)

9. Find the derivative of \(\frac{ax^2 - b}{cx}\)