1) Find \( \frac{dy}{d\theta} \), \( y = \cot \theta \sec \theta \)

2) Find \( \frac{df(\theta)}{d\theta} \), \( f(\theta) = \frac{\csc \theta \cos \theta}{\sin \theta} \)

3) An elastic band is hung on a hook and a mass is hung on the lower end of the band. When the mass is pulled downward and then released, it vibrates vertically. The equation of position of the mass at any time \( t \) seconds is given to be \( s = 2\cos^2(t) + 3\sin(t/2) \) centimeters. Find the velocity at \( t = \pi \).

Use the Chain Rule evaluate the following (Do not back substitute)

5) Find \( \frac{dy}{dx} \) if: \( y = m^2 + m \) and \( m = \sqrt{x} \). for \( x = 4 \)

6) Find \( \frac{dp}{dk} \) if: \( p = q - 2q^3 \) and \( q = r^2 \) and \( r = k + 1 \). for \( k = 2 \)

7) Find \( \frac{dy}{dx} \) for each of the following (using the inside/outside rule)
   a) \( y = \sqrt[3]{(5x^3 - x)^2} \)
   b) \( y = x^3 e^{3-5x} \)
   c) \( y = 7^{2x} \cos^2(3x) \)
   d) \( y = \tan(\sin^2(4x)) \)

8) Find the following limits:
   a) \( \text{Limit}_{x \to 0} \frac{6\sin(3x)}{2x} \)
   b) \( \text{Limit}_{x \to 0} \frac{\sin(3x)\sin(2x)}{2x^2} \)
   c) \( \text{Limit}_{x \to 0} \frac{\sin(3x)}{\sin(x)} \)