1. (15 points each, 30 points total)

A. If \( y = \cos^2 x \), then \( y' \) is which of the following?
   a. \( y' = 2 \cos x \)
   b. \( y' = 2(\cos x)(\sin x) \)
   c. \( y' = \sin^2 x \)
   d. \( y' = -2(\cos x)(\sin x) \)

B. (True or False) Let \( f \) and \( g \) be functions. Then \( (fg)' = (f')(g') \).
   a. True
   b. False

2. (20 points)
A particle is moving along a number line, and its position equation is \( s = 2t^3 - 6t \), where \( t \) is measured in seconds, and \( s \) is measured in meters.

A. Find the velocity of the particle as a function of \( t \).
   \[
   \frac{ds}{dt} = 6t^2 - 6 \text{ m/s}
   \]

B. Find the acceleration of the particle as a function of \( t \).
   \[
   \frac{d^2s}{dt^2} = 12t \text{ m/s}^2
   \]

C. Find the acceleration of the particle when the velocity is 0 (assuming that time is always positive).
   \[
   6t^2 - 6 = 0 \iff t^2 = 1 \iff t = \pm 1
   \]
   \[
   \left( \frac{d^2s}{dt^2} \right)_{t \to \pm 1} = \left[ 12t \right]_{t \to \pm 1} = \pm 12 \text{ m/s}^2
   \]
3. **(20 points)**

Differentiate \( y = 2x^4 \ln(x^{1/4}) = (2x^4)(\frac{1}{4} \ln x) = (\frac{1}{2} x^4)(\ln x) \)

\[
\frac{dy}{dx} = (2x^3)(\ln x) + (\frac{1}{2} x^4)(\frac{1}{x})
\]

\[= 2x^3(\ln x) + \frac{x^3}{2}\]

4. **(30 points)**

Let \( f(x) = e^{2x} \cos x \).

A. Find an equation of the tangent line to \( f(x) \) at \((0,1)\).

\[f'(x) = (2e^{2x})(\cos x) + (e^{2x})(-\sin x)\]

\[\text{slope} = f'(0) = (2)(1) + (1)(-0) = 2\]

\[y-1 = 2(x-0), \quad \text{or} \quad y = 2x + 1\]

B. Find an equation of the normal line to \( f(x) \) at \((0,1)\).

\[\text{slope} = -\frac{1}{2}\]

\[y-1 = -\frac{1}{2}(x-0), \quad \text{or} \quad y = -\frac{1}{2}x + 1\]