Version 1: Problem #1(a) involves the function $y = \dfrac{\ln(4x)}{5x^2} + ...$

1. (a) (4 points) $\dfrac{dy}{dx} = \dfrac{5x^2 \cdot \frac{1}{4x} \cdot 4 - \ln(4x) \cdot 10x}{(5x^2)^2} + e^{x(3x+1)^4} \left[x \cdot 4(3x+1)^3 \cdot 3 + (3x+1)^4 \right]$

   (b) i. (4 points) $\dfrac{1}{36}e^{6x} + 3\ln x + 10 \left(-\dfrac{1}{4}x^{-4} \right) + C$

   ii. (4 ponts) 33.6

2. (a) (4 points) $q = 54$ Items

   (b) (2 points) local minimum

   (c) (4 points) $464.02

3. (4 points each)

   (a) $TR(q) = 25q - 2q^2$, $VC(q) = 2q + 3q^2$

   (b) 6 hundred dollars

   (c) 20.45 hundred dollars

4. (2 points each) (a) 3; (b) 2 and 4; (c) 2; (d) 0;

   (e) from $t = 3$ to $t = 4$ and from $t = 9.5$ to $t = 10$; (f) concave down; (g) 8.

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Version 2: Problem #1(a) involves the function $y = \dfrac{\ln(3x)}{4x^3} + ...$

1. (a) (4 points) $\dfrac{dy}{dx} = \dfrac{4x^3 \cdot \frac{1}{3x} \cdot 3 - \ln(3x) \cdot 12x^2}{(4x^3)^2} + e^{x(5x+1)^2} \left[x \cdot 2(5x+1) \cdot 5 + (5x+1)^2 \right]$

   (b) i. (4 points) $\dfrac{1}{64}e^{8x} + 2\ln x + 8 \left(-\dfrac{1}{4}x^{-4} \right) + C$

   ii. (4 ponts) 31.2

2. (a) (4 points) $q = 48$ Items

   (b) (2 points) local minimum

   (c) (4 points) $757.45

3. (4 points each)

   (a) $TR(q) = 27q - 2q^2$, $VC(q) = 3q + 3q^2$

   (b) 8 hundred dollars

   (c) 20.8 hundred dollars

4. (2 points each) (a) 4; (b) 3 and 5; (c) 3; (d) 0;

   (e) from $t = 4$ to $t = 5$ and from $t = 9.5$ to $t = 10$; (f) concave down; (g) 5.