

Topic Quiz#3 - Derivative

November 1, 2006

Find the derivative of the following functions. Show necessary steps and box your answer. No calculators allowed.

- $A = 40t^3 - 20t^2 + \sqrt[3]{x} + 17$

$$A' = 120t^2 - 80t + \frac{1}{3\sqrt[3]{x^2}}$$

- $B = 10 \ln x$

$$B' = \frac{10}{x}$$

- $C = 100(1.12)^t + 20(4)^t$

$$\begin{aligned} C' &= 100 \ln(1.12)(1.12)^t + 20 \ln(4)(4)^t \\ &= 11.332(1.12)^t + 27.726(4)^t \end{aligned}$$

- $D = 2(x^4 - 3x^2 + 19)^{1000}$

$$D' = 2000(x^4 - 3x^2 + 19)^{999}(4x^3 - 6x)$$

- $E = 9\sqrt{e^{30t} + e^{40t}}$

$$\begin{aligned} E' &= 9 \cdot \frac{1}{2} \cdot \frac{30e^{30t} + 40e^{40t}}{\sqrt{e^{30t} + e^{40t}}} \\ &= \frac{9(15e^{30t} + 20e^{40t})}{\sqrt{e^{30t} + e^{40t}}} \\ &= \frac{45(3e^{30t} + 4e^{40t})}{\sqrt{e^{30t} + e^{40t}}} \end{aligned}$$

HW Test #3 - Derivative

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Find the derivative of the following functions. Show necessary steps and box your answer. No calculators allowed.

- $F = 20e^{w^6-7w+9}$

$$F' = 20e^{w^6-7w+9}(6w^5 - 7)$$

- $G = 30 \ln(q^4 + 100)$

$$\begin{aligned} G' &= 30 \frac{4q^3}{q^4 + 100} \\ &= \frac{120q^3}{q^4 + 100} \end{aligned}$$

- $H = 100s^4e^{6s}$

$$\begin{aligned} a &= 100s^4 & b &= e^{6s} \\ a' &= 400s^3 & b' &= 6e^{6s} \\ H' &= a'b + ab' = 400s^3e^{6s} + 600s^4e^{6s} \\ &= 200s^3e^{6s}(2 + 3s) \end{aligned}$$

- $I = 20t^5 \ln(t)$

$$\begin{aligned} a &= 20t^5 & b &= \ln(t) \\ a' &= 100t^4 & b' &= \frac{1}{t} \\ I' &= 100t^4 \ln(t) + 20t^4 \\ &= 20t^4(5 \ln(t) + 1) \end{aligned}$$

- $J = \frac{t^2-3}{t^3+1}$

$$a = t^2 - 3 \quad b = t^3 + 1$$

$$a' = 2t \quad b' = 3t^2$$

$$J' = \frac{2t \cdot (t^3 + 1) - (t^2 - 3) \cdot 3t^2}{(t^3 + 1)^2}$$

$$= \frac{-t^4 + 9t^2 - 2t}{(t^3 + 1)^2}$$