

## Topic Quiz#3 - Derivative

### Spring 2007

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

- $A = 40t^4 + \sqrt[4]{t} + 15$

$$A' = 160t^3 + \frac{1}{4\sqrt[4]{x^3}}$$

- $B = 30 \ln x$

$$B' = \frac{30}{x}$$

- $C = 100(20.5)^t$

$$\begin{aligned} C' &= 100 \ln(20.5)(20.5)^t \\ &= 302.04(20.5)^t \end{aligned}$$

- $D = 2(x^8 - 3x^4 + 27)^{100}$

$$D' = 200(x^8 - 3x^4 + 27)^{99}(8x^7 - 12x^3)$$

- $E = 10\sqrt{4x^3 + 3e^{40t}}$

$$\begin{aligned} E' &= 10 \cdot \frac{1}{2} \cdot \frac{12x^2 + 120e^{40t}}{\sqrt{4x^3 + 3e^{40t}}} \\ &= \frac{5(12x^2 + 120e^{40t})}{\sqrt{4x^3 + 3e^{40t}}} \\ &= \frac{60(x^2 + 10e^{40t})}{\sqrt{4x^3 + 3e^{40t}}} \end{aligned}$$

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

- $F = 30e^{w^2-7w+9}$

$$F' = 30e^{w^2-7w+9}(2w - 7)$$

- $G = 30 \ln(q^5 + 100) + 40 \ln(q^2 - 8q + 10)$

$$G' = 30 \frac{5q^4}{q^5 + 100} + 40 \frac{2q - 8}{q^2 - 8q + 10}$$

- $H = 100s^7e^{-5s}$

$$a = 100s^7 \quad b = e^{-5s}$$

$$a' = 700s^6 \quad b' = -5e^{-5s}$$

$$\begin{aligned} H' &= a'b + ab' = 700s^6e^{-5s} - 500s^7e^{-5s} \\ &= 100s^6e^{-5s}(7 - 5s) \end{aligned}$$

- $I = 10t^3 \ln(t)$

$$a = 10t^3 \quad b = \ln(t)$$

$$a' = 30t^2 \quad b' = \frac{1}{t}$$

$$\begin{aligned} I' &= 30t^2 \ln(t) + 10t^2 \\ &= 10t^2(3 \ln(t) + 1) \end{aligned}$$

- $J = \frac{t^4-10}{t^4+1}$

$$a = t^4 - 10 \quad b = t^4 + 1$$

$$a' = 4t^3 \quad b' = 4t^3$$

$$\begin{aligned} J' &= \frac{4t^3 \cdot (t^4 + 1) - (t^4 - 10) \cdot 4t^3}{(t^4 + 1)^2} \\ &= \frac{44t^3}{(t^4 + 1)^2} \end{aligned}$$