

QUIZ 2:

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1) Differentiate the functions:

a) $y = e^{\sqrt{3x+5}}$ $f'(g(x)) \cdot g'(x)$

$$e^{(3x+5)^{\frac{1}{2}}} \times \frac{3}{2}(3x+5)^{-\frac{1}{2}} = \left(\frac{3}{2}(3x+5)^{-\frac{1}{2}}\right) e^{(3x+5)^{\frac{1}{2}}}$$

$$\begin{aligned} f &= e^u & f' &= e^u \\ u &= t^{\frac{1}{2}} & u' &= \frac{1}{2}t^{-\frac{1}{2}} \\ t &= 3x+5 & t' &= 3 \end{aligned}$$

$$\frac{1}{2}(3x+5)^{-\frac{1}{2}} \times 3 = \frac{3}{2}(3x+5)^{-\frac{1}{2}} = u'$$

b) $y = (3x+4)^8$

$$\begin{aligned} f'(g(x)) \cdot g'(x) \\ f = u^8 & \quad f' = 8u^7 \\ u = 3x+4 & \quad u' = 3 \end{aligned}$$

$$8(3x+4)^7 \cdot 3 = 24(3x+4)^7$$

c) $y = \sin(x^3 - 2x + e^2)$

$$\begin{aligned} f &= \sin(u) & f' &= \cos(u) \\ u &= x^3 - 2x + e^2 & u' &= 3x^2 - 2 + e^2 \end{aligned}$$

$$\cos(x^3 - 2x + e^2) \cdot (3x^2 - 2 + e^2)$$

$$= (3x^2 - 2 + e^2) \cos(x^3 - 2x + e^2)$$

2) A spherical balloon is being inflated by a compressor that is pumping air at a rate of $4.3 \text{ ft}^3/\text{min}$. At what rate is the radius if the balloon increasing when the radius is 1.5 ft. $V = \frac{4}{3}\pi r^3$
round to 2 decimal places

$$\frac{d}{dt}\left(\frac{4}{3}\pi r^3\right) = 3r^2$$

$$3(1.5)^2 = 6.75$$

$$3(1.5)^2 \left(\frac{4}{3}\pi\right) = 28.26 \text{ ft}^3/\text{min}$$

$$\begin{aligned} f &= \frac{4}{3}\pi & f' &= 0 \\ g &= r^3 & g' &= 3r^2 \end{aligned}$$

$$0(r^3) + 3r^2\left(\frac{4}{3}\pi\right)$$