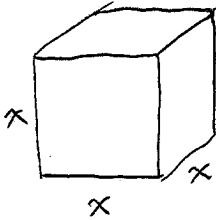


**Quiz 7**

Write your answers on this page. Continue on the back if you need more space.

- (5 pts) 1. The edges of a cube increase at a rate of 3 cm/s. How fast is the volume changing when the length of each edge is 90 cm?

$V =$  volume of cube



$$V = x^3$$

$$\frac{dV}{dt} = 3x^2 \frac{dx}{dt}$$

$$\frac{dx}{dt} = 3 \text{ cm/s}$$

When  $x = 90 \text{ cm}$ ,  $\frac{dV}{dt} = 3 \cdot (90)^2 \cdot (3) = 9 \cdot (90^2) \text{ cm}^3/\text{s}$

$$= 72,900 \text{ cm}^3/\text{s}$$

- (5 pts) 2. Differentiate  $x^x$  using logarithmic differentiation (show your work).

$$y = x^x$$

$$\ln(y) = \ln(x^x)$$

$$\ln(y) = x \ln x$$

$$\frac{d}{dx} \Rightarrow \frac{1}{y} \cdot \frac{dy}{dx} = x \cdot \frac{1}{x} + 1 \cdot \ln(x)$$

$$= 1 + \ln(x)$$

$$\frac{dy}{dx} = y \cdot (1 + \ln(x))$$

$$\frac{dy}{dx} = x^x \cdot (1 + \ln(x))$$

