Quiz 7

(84) Let V = volume, A = surface area

$$V = \frac{4}{3}\pi r^3$$

$$A = 4\pi r^2 \Rightarrow r = \sqrt{\frac{A}{4\pi}}$$

$$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi\left[\sqrt{\frac{A}{4\pi}}\right]^3 = \frac{4}{3}\pi\left(\frac{A}{4\pi}\right)^{3/2}$$

Power rule ↙ Chain rule ↙

$$\frac{dV}{dA} = \frac{4}{3}\pi \cdot \frac{3}{2}\left(\frac{A}{4\pi}\right)^{1/2} \cdot \frac{1}{4\pi} = \frac{1}{2}\left(\frac{A}{4\pi}\right)^{1/2} = \frac{1}{2}\cdot\frac{1}{2}\left(\frac{A}{\pi}\right)^{1/2}$$

$$= \frac{1}{4}\left(\frac{A}{\pi}\right)^{1/2}$$

$$= \boxed{\frac{1}{4}\sqrt{\frac{A}{\pi}}}$$

length of side ↘

(85) $V = s^3 \Rightarrow s = \sqrt[3]{V}$

$$A = 6s^2 = 6\left(\sqrt[3]{V}\right)^2 = 6V^{2/3}$$

$$\frac{dA}{dV} = 6 \cdot \frac{2}{3}V^{-1/3} = 4V^{-1/3} = \boxed{\frac{4}{\sqrt[3]{V}}}$$