

Challenge 3-11 #1

$$\begin{aligned} \downarrow & y = x^6 \\ & dy = 6x^5 dx \end{aligned} \quad \left. \begin{array}{l} \text{for } x=2 \\ dx = -.03 \end{array} \right\} \rightarrow \begin{aligned} dy &= 6 \cdot 2^5 (-.03) \\ &= -5.76 \end{aligned}$$

$$(1.97)^6 = (2 + \Delta x)^6 \approx 2^6 + dy = 64 - 5.76 = 58.24$$

$$2) f(x) = \sqrt{4+5x}$$

$$\text{Find } L(x) \text{ at } x=1$$

$$L(x) = f(1) + f'(1)(x-1)$$

$$\begin{aligned} f'(x) &= \frac{1}{2}(4+5x)^{-\frac{1}{2}}(5) \\ &= \frac{5}{2\sqrt{4+5x}} \end{aligned}$$

$$f'(1) = \frac{5}{2\sqrt{9}} = \frac{5}{6}$$

$$f(1) = \sqrt{9} = 3$$

$$L(x) = 3 + \frac{5}{6}(x-1) = 3 + \frac{5}{6}x - \frac{5}{6} = \frac{13}{6} + \frac{5x}{6}$$

$$\sqrt{9.2} \approx L(1.04) = \frac{13}{6} + \frac{5(1.04)}{6}$$

$$9.2 = 4 + 5x$$

$$5.2 = 5x$$

$$1.04 = x$$

$$\sqrt{8.5} \approx L(.9) = \frac{13}{6} + \frac{5(.9)}{6}$$

$$8.5 = 4 + 5x$$

$$x = .9$$