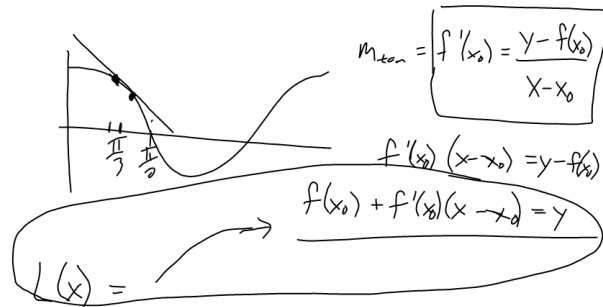


$$\cos 1 = \cdot$$

$$\cos \frac{\pi}{3} = \frac{1}{2}$$



$$\rightarrow y_1 = f(x_0) + f'(x_0)(x_1 - x_0)$$

Δ delta
 Δy - change in $y \rightarrow y_0 - x_1$
 Δx - change in $x \rightarrow x_0 - x_1$

$$\Delta y = f(x_1) - f(x_0)$$

$$\Delta x = x_1 - x_0$$

$$\rightarrow y_1 = f(x_0) + f'(x_0) \Delta x$$

$$y_1 - f(x_0) = f'(x_0) \Delta x$$

$$\Delta y = \underline{f'(x_0) \Delta x = dy}$$

$$dy = f'(x_0) dx$$

$$L(x) = f(x_0) + f'(x_0)(x - x_0)$$

ex.1) $f(x) = \cos x$ at $x_0 = \frac{\pi}{3}$

$$f\left(\frac{\pi}{3}\right) = \cos \frac{\pi}{3} = \frac{1}{2}$$

$$\cos 1 =$$

$$f'(x) = -\sin x$$

$$f'\left(\frac{\pi}{3}\right) = -\sin \frac{\pi}{3} = -\frac{\sqrt{3}}{2}$$

$$L(x) = f\left(\frac{\pi}{3}\right) + f'\left(\frac{\pi}{3}\right)(x - \frac{\pi}{3})$$

$$L(x) = \frac{1}{2} - \frac{\sqrt{3}}{2} \left(x - \frac{\pi}{3}\right)$$

$$\rightarrow L(1) = \frac{1}{2} - \frac{\sqrt{3}}{2} \left(1 - \frac{\pi}{3}\right) \approx .5409$$

ex. 2 $f(x) = \sin x$ for x close to 0

$$L(x) = f(x_0) + f'(x_0)(x - x_0) \quad \left| \quad f'(x) = \cos x \right.$$

$$\sin x \approx L(x) = f(0) + f'(0)(x - 0)$$

$$L(x) = \sin 0 + \cos 0(x - 0)$$

$$= 0 + 1(x)$$

$$\sin x \approx L(x) = x$$

$\sin x \approx x$

ex. 3 $f(x) = \sqrt[3]{x} = x^{1/3}$ $x_0 = 8$

$$f'(x) = \frac{1}{3}x^{-2/3} = \frac{1}{3x^{2/3}} = \frac{1}{3\sqrt[3]{x^2}}$$

$$L(x) = f(8) + f'(8)(x - 8)$$

$$L(x) = 2 + \frac{1}{3}(8)^{-2/3}(x - 8)$$

$$\rightarrow L(x) = 2 + \frac{1}{12}(x - 8)$$

$$L(8.02) = 2 + \frac{1}{12}(8.02 - 8) \approx 2.00167$$

$$L(8.07) = 2 + \frac{1}{12}(8.07 - 8) \approx 2.00583$$

$$L(8.15) = 2 + \frac{1}{12}(8.15 - 8) \approx 2.0125$$

$$L(x) = f(27) + f'(27)(x - 27) \quad x_0 = 27$$

$$L(x) = 3 + \frac{1}{27}(x - 27)$$

$$L(25.2) = 3 + \frac{1}{27}(25.2 - 27) = 2.9333$$

ex. 4 $L(x) = f(x_0) + f'(x_0)(x - x_0)$ $x_0 = 6$

$$L(x) = f(6) + f'(6)(x - 6)$$

$$L(x) = 84 - 6(x - 6)$$

$$L(7) = 84 - 6(7 - 6)$$

$78 + 40435nd$

$$f'(6) \approx \frac{f(10) - f(6)}{10 - 6} = \frac{60 - 84}{4} = -6$$

p. 251 1-5 odd, 9, 13, 15