

p. 67
 (28) $\lim_{x \rightarrow \pi} \tan x = 0$ (30) $\lim_{x \rightarrow 2} \sin \frac{\pi x}{2} = \sin \pi = 0$

(32) $\lim_{x \rightarrow \pi} \cos 3x = -1$ (34) $\lim_{x \rightarrow \frac{5\pi}{3}} \cos x = \frac{1}{2}$

(36) $\lim_{x \rightarrow 7} \sec \frac{\pi x}{6} = \sec \frac{7\pi}{6} = \frac{2\sqrt{3}}{3}$ $\frac{\cos \frac{7\pi}{6}}{\frac{1}{2}} = \frac{\sqrt{3}}{2}$

Write a simpler function that agrees with the function at all but one point.

(42) $h(x) = \frac{x^2 + 3x}{x} = \frac{x(-x + 3)}{x} = -x + 3$

a) $\lim_{x \rightarrow 2} h(x) = -2 + 3 = 1$ b) $\lim_{x \rightarrow 0} h(x) = 0 + 3 = 3$

(44) $f(x) = \frac{x}{x^2 - x} = \frac{x}{x(x-1)} = \frac{1}{x-1}$

a) $\lim_{x \rightarrow 1} f(x) = \frac{1}{1-1} = \text{DNE}$ b) $\lim_{x \rightarrow 0} f(x) = \frac{1}{0-1} = -1$

Find $\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$

Ex. $f(x) = 5x + 3$

$\lim_{\Delta x \rightarrow 0} \frac{5(x + \Delta x) + 3 - (5x + 3)}{\Delta x}$

$\lim_{\Delta x \rightarrow 0} \frac{5x + 5\Delta x + 3 - 5x - 3}{\Delta x}$

$\lim_{\Delta x \rightarrow 0} \frac{5\Delta x}{\Delta x} = 5$

Ex: $f(x) = x^2 + 2x$

$$\lim_{\Delta x \rightarrow 0} \frac{(x+\Delta x)^2 + 2(x+\Delta x) - (x^2 + 2x)}{\Delta x}$$

$\Delta x \rightarrow 0$

$$\lim_{\Delta x \rightarrow 0} \frac{x^2 + 2x\Delta x + (\Delta x)^2 + 2x + 2\Delta x - x^2 - 2x}{\Delta x}$$

$\Delta x \rightarrow 0$

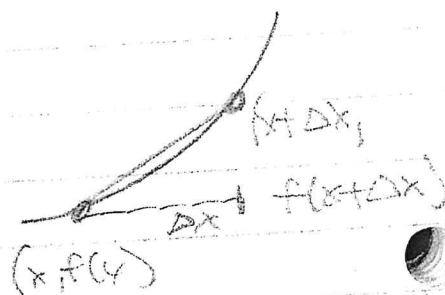
$$\lim_{\Delta x \rightarrow 0} \frac{2x\Delta x + (\Delta x)^2 + 2\Delta x}{\Delta x}$$

$\Delta x \rightarrow 0$

$$\lim_{\Delta x \rightarrow 0} 2x + \Delta x + 2$$

$\Delta x \rightarrow 0$

$$2x + 2$$



$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{f(x+\Delta x) - f(x)}{x+\Delta x - x} = \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

(16)
$$F(x) = \begin{cases} 3 & x \neq 2 \\ 5 & x = 2 \end{cases}$$
 Find $\lim_{x \rightarrow 2} f(x)$

$$= 3$$