

Sec. 2.4

p. 89 #5, 51, 52, 54, 55, 57

⑤ $\text{discont. @ } x=0 \quad \lim_{x \rightarrow 0^-} f(x) = \infty \quad \lim_{x \rightarrow 0^+} f(x) = 2$

$\text{discont @ } x=2 \quad \lim_{x \rightarrow 2} f(x) = b \quad \text{pt } (2, b) \text{ would make } f(x) \text{ cont.}$

⑤① $f(x) = \begin{cases} x^2 & x \leq 1 \\ 2-x & x > 1 \end{cases} \quad f(1) = 1$
 $\lim_{x \rightarrow 1} f(x) = 1 \quad \lim_{x \rightarrow 1^-} x^2 = 1$
 $\lim_{x \rightarrow 1^+} 2-x = 1$
 $f(1) = \lim_{x \rightarrow 1} f(x) \therefore f(x) \text{ is cont @ } x=1$

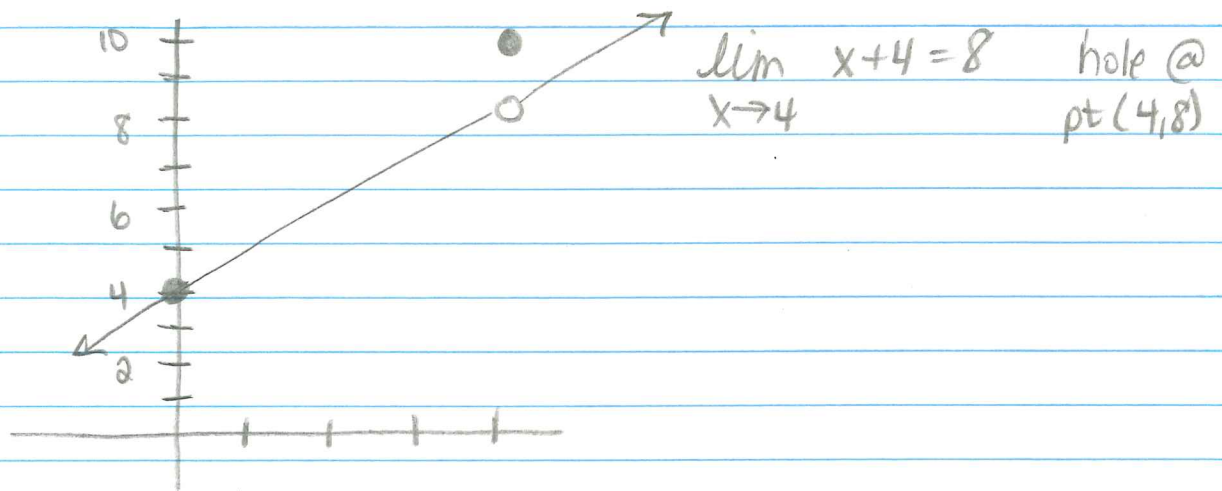
⑤② $f(x) = \begin{cases} x+1 & x < 1 \\ \frac{1}{x} & x \geq 1 \end{cases} \quad f(1) = 1$
 $\lim_{x \rightarrow 1} f(x) = \text{DNE} \quad \lim_{x \rightarrow 1^-} x+1 = 2$
 $\lim_{x \rightarrow 1^+} \frac{1}{x} = 1$
 $\therefore f(x) \text{ is not cont. @ } x=1$

⑤④ $f(x) = \begin{cases} x^3+1 & -\infty < x \leq 0 \\ -x+1 & 0 < x < 2 \\ -x^2+10x-15 & x \geq 2 \end{cases}$

| | | |
|---|---|--|
| $f(0) = 0^3+1 = 1$ | } | $f(2) = -2^2+10(2)-15 = 1$ |
| $\lim_{x \rightarrow 0} f(x) = 1$ | | $\lim_{x \rightarrow 2} f(x) = \text{DNE}$ |
| $\lim_{x \rightarrow 0^-} x^3+1 = 1$ | | $\lim_{x \rightarrow 2^-} -x+1 = -1$ |
| $\lim_{x \rightarrow 0^+} -x+1 = 1$ | | $\lim_{x \rightarrow 2^+} -x^2+10x-15 = 1$ |
| $f(0) = \lim_{x \rightarrow 0} f(x)$ | | $\lim_{x \rightarrow 2} f(x) = \text{DNE}$ |
| $\therefore f(x) \text{ is cont. @ } x=0$ | | $f(x) \text{ is not cont. @ } x=2$ |

$$(55) f(x) = \begin{cases} \frac{x^2-16}{x-4} & x \neq 4 \\ 10 & x = 4 \end{cases} \quad f(4) = 10$$

$$\lim_{x \rightarrow 4} \frac{(x+4)(x-4)}{(x-4)} =$$



$$(57) f(x) = \begin{cases} x^2 - c & x < 5 \\ 4x + 2c & x \geq 5 \end{cases} \quad f(5) = 4x + 2c = 20 + 2c$$

doesn't help

$$\lim_{x \rightarrow 5^-} x^2 - c = \lim_{x \rightarrow 5^+} 4x + 2c$$

$$25 - c = 20 + 2c$$

$$5 = 3c$$

$$\frac{5}{3} = c$$