Try it before next class, we will review it in class also.

Find the values of c and d that make f continuous for all x or determine that no such values of c and d exist.

$$f(x) = \begin{cases} \dfrac{\sin(6x)}{cx} & , \quad x < 0 \\ d & , \quad 0 \le x \le 6 \\ \dfrac{x^2 - 6x}{x - 6} & , \quad x > 6 \end{cases}$$

3 conditions for cont.

1) $f(x) \to f(a)$

2) $\lim_{x \to a} f(x) \to \lim_{h \to 0} f(x)$

3) 1) = 2)

Special trig limit: $\lim_{x \to 0} \dfrac{\sin(kx)}{(kx)} = 1$

First, check the cont. for each piece:

Check the 3 conditions for transition P. $(x = 0, 6)$

$x = 0$

1) $f(0) = d$

2) $\lim_{x \to 0} f(x) \to RL = LL$

$$\lim_{x \to 0^+} (d) = \lim_{x \to 0^-} f(x)$$

$$\lim_{x \to 0^+} (d) = \lim_{x \to 0^-} \left(\frac{\sin(6x)}{cx} \cdot \frac{6}{6} \right)$$

$$d = \lim_{x \to 0^-} \left(\frac{6}{c} \right) \Rightarrow \boxed{d = \frac{6}{c}}$$

3) $f(0) = \lim_{x \to 0} f(x) \Rightarrow \boxed{d = d = \frac{6}{c}}$

Find the values of c and d that make f continuous for all x or determine that no such values of c and d exist.

$$f(x) = \begin{cases} \dfrac{\sin(6x)}{cx} & , \quad x < 0 \\ d & , \quad 0 \le x \le 6 \\ \dfrac{x^2 - 6x}{x - 6} & , \quad x > 6 \end{cases}$$

$x = 6$

1) $f(6) = d$

2) $\lim_{x \to 6} f(x)$

$LL = RL$

$\lim_{x \to 6^-} f(x) = \lim_{x \to 6^+} f(x)$

$\lim_{x \to 6^-} (d) = \lim_{x \to 6^+} \left(\dfrac{x(x-6)}{x-6} \right)$

$\boxed{d = 6}$

3) $d = 6$

$d = \dfrac{6}{c} \Rightarrow 6 = \dfrac{6}{c} \Rightarrow \boxed{c = 1}$