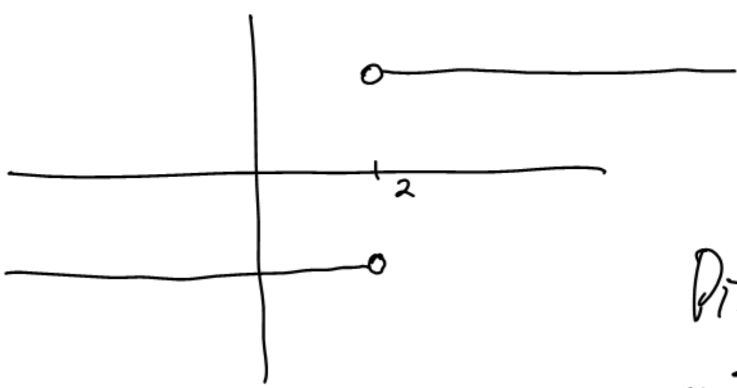
Discussion Assignment

Sections 2.4, 3.1, 3.2

Exam 1 Thursday 5/18
covering 2.2, 2.3, 2.4, 3.1, 3.2,

Section 2.4

136 $$f(x) = \frac{\boxed{|x-2|}}{x-2} = \begin{cases} \frac{-(x-2)}{x-2} = -1 & \text{for } x<2 \\ \frac{x-2}{\cancel{x-2}} = 1 & \text{for } x>2 \end{cases}$$



Discontinuous at $x=2$
with a jump discontinuity.

138 $$f(t) = \frac{t+3}{t^2+5t+6} = \frac{t+3}{(t+3)(t+2)}$$

Continuous at every $t \neq -2, -3$

$t=-2$ infinite discontinuity, because the function has $\frac{\text{nonzero}}{0}$ form.

$t=-3$ $$\lim_{t\to -3} \frac{\cancel{t+3}}{\cancel{(t+3)}(t+2)} = \lim_{t\to -3} \frac{1}{t+2} = -1$$

removable discontinuity, $\lim_{x\to -3} f(x)$ exists but doesn't equal $f(-3)$.

(142) $f(x) = \dfrac{\sin(\pi x)}{\tan(\pi x)}$ at $x=1$.

$$f(1) = \frac{\sin(\pi)}{\tan(\pi)} = \frac{0}{0} \text{ undefined.}$$

$$\lim_{x\to 1} \frac{\sin(\pi x)}{\tan(\pi x)} = \lim_{x\to 1} \frac{\frac{\sin(\pi x)}{1}}{\frac{\sin(\pi x)}{\cos(\pi x)}} = \lim_{x\to 1} \frac{\cancel{\sin(\pi x)}}{1} \frac{\cos(\pi x)}{\cancel{\sin(\pi x)}} = \lim_{x\to 1} \cos(\pi x)$$

$$= \cos(\pi) = -1$$

Removable discontinuity at $x=-1$.

(144)

$$f(x) = \begin{cases} x\sin(x) & \text{for } x \le \pi \\ x\tan(x) & \text{for } x > \pi \end{cases} \quad \text{at } x = \pi.$$

$$\lim_{x\to\pi^-} f(x) = \lim_{x\to\pi^-} x\sin(x) = 0$$

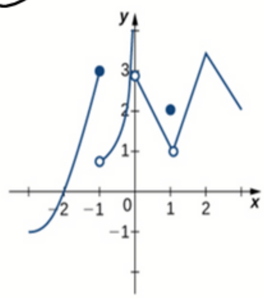
$$\lim_{x\to\pi^+} f(x) = \lim_{x\to\pi^+} x\tan(x) = \pi\tan(0) = \pi\frac{\sin(0)}{\cos(0)} = \pi\frac{0}{1} = 0$$

$$f(\pi) = \pi\sin(\pi) = 0$$

Continuous at $x=\pi$.

of [1.575, 1.6]. Briefly explain your response for each interval.

154. Consider the graph of the function $y = f(x)$ shown in the following graph.



a. Find all values for which the function is discontinuous.
b. For each value in part a., state why the formal definition of continuity does not apply.
c. Classify each discontinuity as either jump, removable, or infinite.

Not continuous at

$x = -1, 0, 1$

$x=-1$ jump discontinuity.

$$\lim_{x \to a} f(x) = f(a)$$

↑ doesn't exist

$x=0$ infinite discontinuity

$$\lim_{x \to a} f(x) = f(a)$$

↑ doesn't exist

$x=1$ removable discontinuity.

$$\lim_{x \to a} f(x) \neq f(a)$$

168

$$F(r) = k_e \frac{|q_1 q_2|}{r^2}$$

← constants

← distance, a variable.

(a) as r increases $F(r)$ decreases so if $F(R)$ is small, Then it is disregarded entirely. Too small to have anything but a negligible effect.

(b) with This assumption

$$F(r) = \begin{cases} \text{for } r < R, & k_e \dfrac{|q_1 q_2|}{r^2} \\ \text{for } r \geq R, & 0 \end{cases}$$

(d) Never continuous at $r = R$