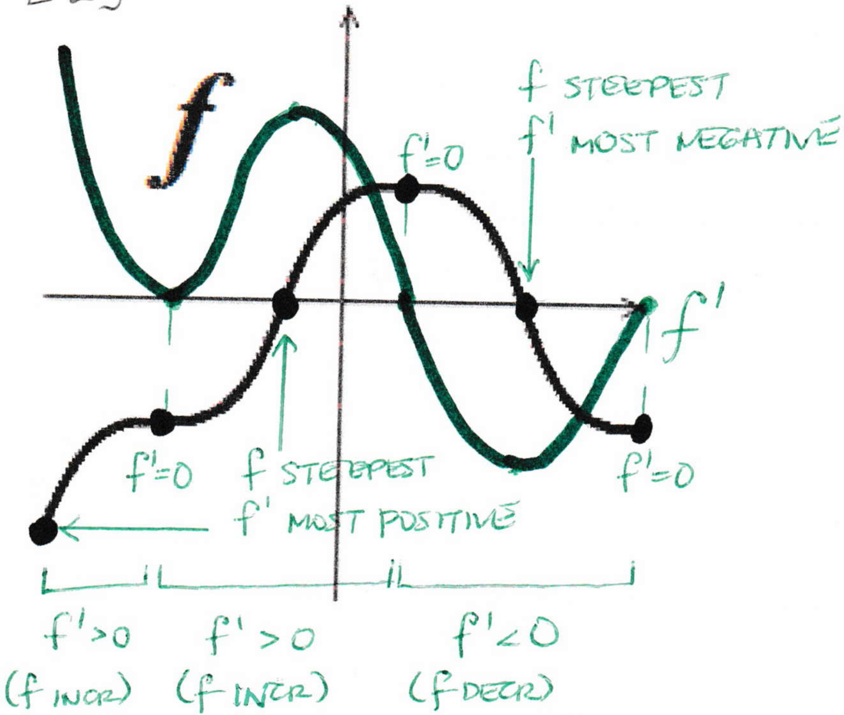
[2]



GRADED BY ME

[3] BJ IS CORRECT $\frac{1}{2}$ $f(x) = \frac{8}{x^4}$, SO f(0) DNE. $\frac{1}{2}$

f IS NOT CONTINUOUS AT 0,

SO f IS NOT CONTINUOUS ON $[-\frac{1}{2}, 2]$ $\frac{1}{2}$

$\frac{1}{2}$ IVT DOESN'T APPLY + TELLS US NOTHING.

[4] [a] $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

$$= \boxed{\lim_{h \to 0} \frac{\frac{2-(x+h)}{1+2(x+h)} - \frac{2-x}{1+2x}}{h}} \cdot \frac{(1+2(x+h))(1+2x)}{(1+2(x+h))(1+2x)} \quad (1)$$

$$= \lim_{h \to 0} \frac{(2-x-h)(1+2x) - (2-x)(1+2x+2h)}{h(1+2x+2h)(1+2x)}$$

$$(1\tfrac{1}{2}) \quad = \boxed{\lim_{h \to 0} \frac{(\cancel{2} - \cancel{x} - h + \cancel{4x} - \cancel{2x^2} - \cancel{2xh}) - (\cancel{2} - \cancel{x} + \cancel{4x} - \cancel{2x^2} + 4h - \cancel{2xh})}{h(1+2x+2h)(1+2x)}}$$

$$= \lim_{h \to 0} \frac{-5\cancel{h}}{\cancel{h}(1+2x+2h)(1+2x)}$$

$$(\tfrac{1}{2}) \quad = \boxed{\lim_{h \to 0} \frac{-5}{(1+2x+2h)(1+2x)}} = \boxed{\frac{-5}{(1+2x)^2}} \quad (\tfrac{1}{2})$$

[b] $f(-1) = \frac{2 - {}^{-}1}{1+2(-1)} = \boxed{-3}$

$f'(-1) = \frac{-5}{(1+2(-1))^2} = \boxed{-5}$ $(\tfrac{1}{2})$ MUST HAVE BOTH

$y - {}^{-}3 = -5(x - {}^{-}1)$

$\boxed{y + 3 = -5(x+1)}$ (1)

[5] $\boxed{\lim_{x\to\infty} \frac{e^{2x}}{1-e^x}} \cdot \frac{\frac{1}{e^x}}{\frac{1}{e^x}}$ $\frac{1}{2}$

$e^{2x} \to \infty$

$e^x \to \infty$, so $1-e^x \to -\infty$ $\frac{\infty}{-\infty}$ INDETERMINATE

$= \boxed{\lim_{x\to\infty} \frac{e^x}{e^{-x}-1}} = -\infty$ $\frac{1}{2}$

$e^x \to \infty$

$e^{-x} \to 0$, so $e^{-x}-1 \to -1$ $\boxed{\frac{\infty}{-1} \to -\infty}$ $\frac{1}{2}$

$\frac{1}{2}$ $\boxed{\text{arctan } x \text{ IS CONTINUOUS ON } (-\infty, \infty)}$

SO, $\lim_{x\to\infty} \arctan \frac{e^{2x}}{1-e^x} = \boxed{\lim_{t\to-\infty} \arctan t} = \boxed{-\frac{\pi}{2}}$ $\frac{1}{2}$

$\frac{1}{2}$

[6] $\dfrac{x^2-1}{x^3-x^2}$ IS DISCONT WHERE $x^3-x^2=0$

$x^2(x-1)=0$

$x=0,1$ (PART OF "IF $x<2$")

$\dfrac{1-x^2}{x^3-2x}$ IS DISCONT WHERE $x^3-2x=0$

$x(x^2-2)=0$

$x=0,\pm\sqrt{2}$ (NOT PART OF "IF $x>2$")

ALSO, POSSIBLE DISCONT AT $x=2$

$x=0$: $\boxed{\lim\limits_{x\to 0}\dfrac{x^2-1}{x^2(x-1)}}=\infty$ $\frac{1}{2}$ $\boxed{\text{INFINITE DISCONTUITY @ } x=0}$ $\frac{1}{2}$

$x^2-1\to -1$

$x^2\to 0^+$ $\boxed{\dfrac{-1}{0^+(-1)}\to\infty}$ $\frac{1}{2}$

$x-1\to -1$

$x=1$: $\boxed{\lim\limits_{x\to 1}\dfrac{x^2-1}{x^2(x-1)}}=\boxed{\lim\limits_{x\to 1}\dfrac{x+1}{x^2}=2}$ $\frac{1}{2}$ EXISTS $\frac{1}{2}$

BUT $\boxed{f(1)\text{ DNE}}$ $\frac{1}{2}$

$\boxed{\text{REMOVABLE DISCONTINUITY @ } x=1}$ $\frac{1}{2}$

$x=2$: $\frac{1}{2}$ $\boxed{\lim\limits_{x\to 2^+}\dfrac{1-x^2}{x^3-2x}=\dfrac{-3}{4}}$ $\boxed{\text{BOTH EXIST, BUT NOT EQUAL}}$ $\frac{1}{2}$

$\frac{1}{2}$ $\boxed{\lim\limits_{x\to 2^-}\dfrac{x^2-1}{x^3-x^2}=\dfrac{3}{4}}$ $\boxed{\text{JUMP DISCONTINUITY @ } x=2}$ $\frac{1}{2}$