Math 119 HW #2

Section 3.2 #7,

Section 3.3 # 2, 15, 17, 25d

3.2 #7 $f(x) = \frac{5+x}{x(x-2)}$ discontinuous at $x(x-2)=0$

$x=0$ or $x-2=0$

$x=0$ or $x=2$.

for $a=0$: $\lim_{x\to 0} \frac{5+x}{x(x-2)} = \frac{5+0}{0(0-2)} = \frac{5}{0}$ DNE

for $a=2$: $\lim_{x\to 2} \frac{5+x}{x(x-2)} = \frac{5+2}{2\cdot(2-2)} = \frac{7}{0}$ DNE

3.3 #2 Avg rate of change for $y = -4x^2 - 6$ from $x=2$ to $x=6$

$$\frac{f(b)-f(a)}{b-a} = \frac{f(6)-f(2)}{6-2} = \frac{-4\cdot 6^2-6-(-4\cdot 2^2-6)}{4} = \frac{-4\cdot 36-6+16+6}{4} = -32$$

3.3 #15 Inst rate of change for $f(x) = x^2+2x$ at $x=0$

$$\lim_{h\to 0} \frac{f(a+h)-f(a)}{h} = \lim_{h\to 0} \frac{f(h)-f(0)}{h} = \lim_{h\to 0} \frac{h^2+2h-(0^2+2\cdot 0)}{h}$$

$$= \lim_{h\to 0} \frac{h^2+2h}{h} = \lim_{h\to 0} h+2 = 2$$

3.3 # 17

~~$f(x) = x^2 + 2$, find rate of change at x~~

$g(t) = 1 - t^2$, its rate of change at $t = -1$

$$\lim_{h\to 0} \frac{g(a+h) - g(a)}{h} = \lim_{h\to 0} \frac{g(-1+h) - g(-1)}{h}$$

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

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

$$= \lim_{h\to 0} \frac{2h-h^2}{h} = \lim_{h\to 0} 2-h = 2$$

3.3 # 25d

$P(x) = 2x^2 - 5x + 6$

Find marginal profit at $x = 4$

$$\lim_{h\to 0} \frac{P(a+h) - P(a)}{h} = \lim_{h\to 0} \frac{P(4+h) - P(4)}{h}$$

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$$= \lim_{h\to 0} \frac{2(4+h)^2 - 5(4+h) + 6 - (2\cdot 4^2 - 5\cdot 4 + 6)}{h}$$

$$= \lim_{h\to 0} \frac{2(16+8h+h^2) - 20 - 5h + 6 - 18}{h}$$

$$= \lim_{h\to 0} \frac{32+16h+2h^2 - 32 - 5h}{h} = \lim_{h\to 0} \frac{11h+2h^2}{h}$$

$$= \lim_{h\to 0} 11 + 2h = 11$$

or \$1100