Unit 2 Review Sheet Work:

Friday, October 03, 2014
9:34 AM

Mult Choice Answers on Back: 6. B 8. C 23. C 25. E 41. A

2. a. $y=|x+3|-1 \longrightarrow x+3=0 \longrightarrow x=-3$ Corner

b. $y=(2x-1)^{\frac{5}{3}} \longleftarrow$ Even though this is $\frac{odd}{odd}$, it is not <1.

No non-differentiabilities.

c. $f(x)=\dfrac{5+x}{2x+4} \longrightarrow 2x+4=0 \longrightarrow x=-2$ (Vertical Asymptote)

Infinite Discontinuity

d. $g(x)=\sqrt[3]{(2x-7)^2} = (2x-7)^{\frac{2}{3}} \longrightarrow 2x-7=0 \longrightarrow x=\frac{7}{2}$

$\frac{even}{odd}$ Cusp

3 a & b $\longrightarrow$ Math 8 on calculator

c. At $x=-2$, there is a hole so $y'(-2)$ DNE (Removable Discontinuity)

d. Use Math 8 on calculator. There is a corner at $x=1/3$ but no problem at $x=3$.

4a. Tangent:

$y=\sin x \quad x=0, y=0, m=1$ [from 3a]

$y=mx+b \longrightarrow y=1x \longrightarrow y=x$

Normal:

$x=0, y=0, m=-1$

$y=mx+b \longrightarrow y=-1x \longrightarrow y=-x$

b. Tangent:

$f(x)=e^x, \; x=2, y=e^2, m\approx 7.389=e^2$ [from 3b]

$y-y_1=m(x-x_1) \longrightarrow y-e^2=e^2(x-2)$ or $y-e^2=7.389(x-2)$

Normal:

$f(x)=e^x \quad x=2, y=e^2, m\approx -.135=\frac{-1}{e^2}$

$y-y_1=m(x-x_1) \longrightarrow y-e^2=\frac{-1}{e^2}(x-2)$ or $y-e^2=-.135(x-2)$

5. a. $y'=\lim \dfrac{3(x+h)-3x}{\ldots}$

b. $y'=\lim\limits_{h\to 0} \dfrac{\frac{5}{x+h}-\frac{5}{x}}{h}$

5. a. $y' = \lim_{h \to 0} \dfrac{3(x+h) - 3x}{h}$

$= \lim_{h \to 0} \dfrac{\cancel{3x} + 3h - \cancel{3x}}{h}$

$= \lim_{h \to 0} \dfrac{3\cancel{h}}{\cancel{h}} = 3$

$\therefore y' = 3$

b. $y' = \lim_{h \to 0} \dfrac{\frac{5}{x+h} - \frac{5}{x}}{h}$

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

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

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

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

$\therefore y' = -5/x^2$

c. $f'(x) = \lim_{h \to 0} \dfrac{1 - (x+h)^2 - (1 - x^2)}{h}$

$= \lim_{h \to 0} \dfrac{\cancel{1} - \cancel{x^2} - 2xh - h^2 - \cancel{1} + \cancel{x^2}}{h}$

$= \lim_{h \to 0} \dfrac{\cancel{h}(-2x - h)}{\cancel{h}} = -2x$

$\therefore f'(x) = -2x$

d. $g'(x) = \lim_{h \to 0} \dfrac{\left(\sqrt{3(x+h)} - \sqrt{3x}\right)\left(\sqrt{3x+3h} + \sqrt{3x}\right)}{h\left(\sqrt{3x+3h} + \sqrt{3x}\right)}$

$= \lim_{h \to 0} \dfrac{\cancel{3x} + 3h - \cancel{3x}}{h(\sqrt{3x+3h} + \sqrt{3x})}$

$= \lim_{h \to 0} \dfrac{3\cancel{h}}{\cancel{h}(\sqrt{3x+3h} + \sqrt{3x})} = \dfrac{3}{2\sqrt{3x}}$

$\therefore g'(x) = \dfrac{3}{2\sqrt{3x}}$