ID#________ Section:_____ Quiz 2 MATH 101-T121 Serial #_____

1. Using the definition of derivative, evaluate $\lim_{x\to 3}\frac{(33-2x)^{-2/3}-(1/9)}{x-3}$.

i. Function: $f(x) = (33-2x)^{-2/3}$

$a = 3$

$f(a) = (33-6)^{-2/3}$

$= (27)^{-2/3} = \left(\frac{1}{3}\right)^2 = \frac{1}{9}$

ii) $\lim_{x\to 3}\frac{(33-2x)^{-2/3} - 1/9}{x-3}$

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

$= f'(a) = f'(3)$

iii) $f'(x) = \frac{-2}{3}(33-2x)^{-5/3}(-2)$

iv) $f'(3) = \frac{-4}{3}(27)^{-5/3}$

$= \frac{-4}{3}\left(\frac{1}{3}\right)^5 = \frac{-4}{729}$

Ans $\lim_{x\to 3}\frac{(33-2x)^{-2/3}-(1/9)}{x-3}$

$= \frac{-4}{729}$

2. Find an equation of the normal line to the graph of the curve $G(u)=\frac{(u+4)(u-2)}{u^3+2}$ when $u=1$.

1) $G(u) = \frac{u^2+2u-8}{u^3+2}$

2) $G'(u) = \frac{(u^3+2)(2u+2)-(u^2+2u-8)3u^2}{(u^3+2)^2}$

3) $G'(1) = \frac{(3)(4)-(-5)3}{(3)^2} = 3$

4) Slope of normal line when $u=1$:

$= -1/3$

5) Eq. of normal line:

$u_0 = 1$

$y_0 = G(u_0) = G(1)$

$= \frac{-5}{3}$

$y - y_0 = m(u-u_0)$

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

ID#________ Section:_____ Quiz 3 MATH 101-T112 Serial #_____

1. Using the definition of derivative, evaluate $\lim_{x\to -2}\frac{(7x+6)^{-1/3}+(1/2)}{x+2}$.

i- Function : $f(x)=(7x+6)^{-1/3}$

$a = -2$

$f(a) = (-14+6)^{-1/3}$

$= (-8)^{-1/3} = -1/2$

(ii) $\lim_{x\to -2} \frac{(7x+6)^{-1/3}+(1/2)}{x+2}$

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

$= f'(a) = f'(-2)$

(iii) $f'(x) = \frac{-1}{3}(7x+6)^{-4/3}\cdot 7$

(iv) $f'(-2) = \frac{-7}{3}(-14+6)^{-4/3}$

$= \frac{-7}{3}(-1/2)^4$

$= \frac{-7}{3}\left(\frac{1}{16}\right)$

$= \frac{-7}{48}$

Ans

$\lim_{x\to -2} \frac{(7x+6)^{-1/3}+(1/2)}{x+2} = \frac{-7}{48}$

2. Find an equation of the normal line to the graph of the curve $K(w)=\frac{(w+1)(w-2)}{w^2+1}$ when $w=1$.

1) $K(\omega) = \frac{\omega^2-\omega-2}{\omega^2+1}$

2) $K'(\omega) = \frac{(\omega^2+1)(2\omega-1)-(\omega^2-\omega-2)2\omega}{(\omega^2+1)^2}$

3) $K'(1) = \frac{(2)(1)-(-2)(2)}{(2)^2} = 3/2$

4) Slope of normal line when $\omega = 1$

$= -2/3$

(5) Eq. of normal line:

$y - y_0 = m(\omega - \omega_0)$

$\omega_0 = 1$

$y_0 = K(\omega_0)$

$= K(1)$

$= \frac{(2)(-1)}{1+1}$

$= -1$

$$\boxed{y+1 = \frac{-2}{3}(\omega - 1)}$$