

NAME: _____ I.D.# _____, Sec# 6(9:20)7(10:30)

SHOW DETAILED COMPLETE SOLUTION WITH ALL NECESSARY STEPS.

Q.1. (Marks: 15). [82SHE35]. Let $f(x) = 2x - 5$. Then $\lim_{x \rightarrow 4} f(x) = 3$. Let $\varepsilon = 0.06$. Use the ε, δ definition of the limit of a function at a point to find the maximum positive real number δ such that whenever $0 < |x - 4| < \delta$ then it implies that $|f(x) - 3| < \varepsilon = 0.06$.

Answer $\delta =$ _____.

Q.2. (Marks: 10+10=20). 131SHE55. Let $f(x) = \begin{cases} x^2 - x, & x \leq 2 \\ 2x - 2, & x > 2. \end{cases}$

(a) Find the left hand derivative $f'_-(a) = \lim_{h \rightarrow 0^-} \frac{f(a+h) - f(a)}{h}$ at $a = 2$.

Answer: $f'_-(2) =$ _____.

(b) Find the right hand derivative $f'_+(b) = \lim_{h \rightarrow 0^+} \frac{f(b+h) - f(b)}{h}$ at $b = 2$.

Answer: $f'_+(2) =$ _____.

Q.3. (Marks: 15). Use the definition of the derivative $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ to find $f'(x)$ of the function $f(x) = \sqrt{3x-2}$ at the point $x = 2$. (Answer: $f'(2) =$ _____.)