**Q// prove that if f(*x*) = C .**

 **C is a constant then** $\grave{f}$**(*x*) = 0 ?**

**أثبت أنَّه إذا كانت الدالة = ثابت, فإن مشتقها = صفر**

 **if f(*x*) = C**

$\grave{f}$**(*x*) = *Lim*** $\frac{ f\left(x+∆x\right)-f(x)}{∆x}$

**Δx → 0**

$\grave{f}$**(*x*) = *Lim*** $\frac{ \left(C\right)-[C]}{∆x}$

**Δx → 0**

$\grave{f}$**(*x*) = *Lim*** $\frac{ 0}{∆x}$ ***=* 0**

**Δx → 0**

**Ex: Find** $\grave{f}$**(*x*) by using definition Method (D.M)**

**if f(*x*) =** $\frac{2}{1-x}$

$\grave{f}$**(*x*) = *Lim*** $\frac{f\left(x+∆x\right)-f(x)}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\frac{2}{1-(x+∆x)} - \left(\frac{2}{1-x}\right)}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\frac{2}{1-x-∆x} - \frac{2}{1-x}}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\frac{2-2x-2+2x+2∆x}{\left(1-x- ∆x\right) (1-x)}}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\frac{2 ∆x}{\left(1-x- ∆x\right) (1-x)}}{∆x}$

**Δx → 0**

 = ***Lim*** $\frac{2 ∆x}{\left(1-x- ∆x\right) (1-x)}\* \frac{1}{∆x}$

**Δx → 0**

 = ***Lim*** $\frac{2 }{\left(1-x- ∆x\right) (1-x)}$

**Δx → 0**

 = $\frac{2 }{\left(1-x- 0\right) (1-x)}= \frac{2}{\left(1-x\right)^{2}}$

**Ex: Find** $\grave{f}$**(*x*) by using D.M for Following Function:**

**if f(*x*) = *x* (*x* +1)**

1. $\grave{f}$**(*x*) = *Lim*** $\frac{f\left(x+∆x\right)-f(x)}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\left(x+ ∆x\right)\left((x+ ∆x\right)+1)- \left[x (x+1)\right]}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{(x+ ∆x)^{2}+\left(x+ ∆x\right)-[x^{2}+x]}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{x^{2}+2x∆x+(∆x)^{2}+x+ ∆x- x^{2}-x}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{2x∆x+(∆x)^{2}+∆x}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{∆x [2x+ ∆x+1]}{∆x}$

**Δx → 0**

 **= *Lim* 2*x* + Δ*x* + 1**

**Δx → 0**

 **= 2*x* +1**

1. **f(*x*) =** $\frac{1}{x}$

$\grave{f}$**(*x*) = *Lim*** $\frac{f\left(x+∆x\right)-f(x)}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\left(\frac{1}{\left(x+∆x\right)}\right)- \left[\frac{1}{x}\right]}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\frac{x-(x+∆x)}{x-(x+∆x)}}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\frac{x-x- ∆x}{x^{2}+x ∆x}}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{\frac{-∆x}{x^{2}+x ∆x}}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{- ∆x}{x^{2}+x ∆x} . \frac{1}{∆x}$

**Δx → 0**

 **= *Lim*** $\frac{-1}{x^{2}+x ∆x}$ ** =** $\frac{-1}{x^{2}}$

**Δx → 0**