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**DEPARTMENT: CIVIL ENGINEERING**

**LEVEL: 200**

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**COURSE: ENG 281; ENGINEERING MATHEMATICS**

1. $\lim\_{x\to 3+}f(x) \frac{3-x}{\left|3-x\right|}$

**=**$\frac{3-(3+h)}{\left|3-(3+h)\right|}$ =$\frac{h}{\left|h\right|}$

As h$>$0, $\left|h\right|$= 1

=$\frac{h}{h}$ , =1

1. $\lim\_{x\to 3}f(x) \frac{x-3}{\left|x-3\right|}$

$\lim\_{x\to 3+}=\frac{\left(3+h\right)-3}{\left|\left(3+h\right)-3\right|}$=

=$\frac{h}{\left|h\right|}$

As h$>0, \left|h\right|$ = h

=$\frac{h}{h}$ = 1

$\lim\_{x\to 3-}=\frac{x-3}{\left|x-3\right|}$= =$\frac{\left(3-h\right)-3}{\left|\left(3-h\right)-3\right|}$

= $\frac{-h}{\left|-h\right|}$, $\left|-h\right|=1$

= $\frac{-h}{h}$ = -1

Therefore, 1$\ne -1. $ $\lim\_{x\to 3+}d\ne \lim\_{x\to 3-}d$

1. F(x) =$\sqrt{x-4}$ at intervals [4,8]

=$\sqrt{x-4}$

=$\sqrt{\left(4+h\right)-4}$

=$\sqrt{h}$, as h$\rightarrow 0$

= 0 (i)

=$\sqrt{\left(4-h\right)-4}$, $\sqrt{-h}$ as h$\rightarrow 0, =0 (ii)$

From equations (i) and (ii), f(x) = f(4). Therefore, f(x) is continuous at 4.

And, =$\sqrt{\left(8+h\right)-4}$

=$\sqrt{4+h}$ as h$\rightarrow 0$,

=$\sqrt{4}$ = 2 (iii)

=$\sqrt{\left(8-h\right)-4}$

=$\sqrt{4-h}$ as h$\rightarrow 0. =\sqrt{4 }$ = 2. (iv)

From equations (iii) and (iv),

f(x) = f(8). Thus, f(x) is continuous at 8