Assignment 1

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MAT 110 : Differential Calculus and Co-ordinate Geometry.
SET : I

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Math Section : 8

ANSWER TO THE PROBLEM NO: 1

$$\lim_{x\to 0^+} xlnx \tag{1}$$

$$= \lim_{x\to 0^+} \frac{lnx}{\frac{1}{x}} \tag{2}$$

$$= \lim_{x\to 0^+} \frac{\frac{1}{x}}{-\frac{1}{x^2}} \tag{3}$$

$$= \lim_{x\to 0^+} -x \tag{4}$$

$$= 0(Ans) \tag{5}$$

ANSWER TO THE PROBLEM NO: 2

$$\lim_{x\to 1} \frac{x^3-1}{x-1} \tag{6}$$

$$= \lim_{x\to 1} \frac{(x-1)(x^2+x+1)}{(x-1)} \tag{7}$$

$$= \lim_{x\to 1} (x^2+x+1) \tag{8}$$

$$= 1^2+1+1 \tag{9}$$

$$= 3(Ans) \tag{10}$$

ANSWER TO THE PROBLEM NO: 3(a)

$$f(-3) = k \tag{11}$$

$$So, k = \lim_{x \to -3} f(x) \tag{12}$$

$$= \lim_{x \to -3} \frac{x^2 - 9}{x + 3} \tag{13}$$

$$= \lim_{x \to -3} \frac{(x+3)(x-3)}{x+3} \tag{14}$$

$$= \lim_{x \to -3} (x - 3) \tag{15}$$

$$= -3 - 3 \tag{16}$$

$$= -6(Ans) \tag{17}$$

ANSWER TO THE PROBLEM NO: 3(b)

With 'k' assigned the value from (a) shows that f(x) can be expressed on a polynominal. f(x) with 'k' assigned value -6, is equivalent to the function g(x)=x-3.

ANSWER TO THE PROBLEM NO: 4

$$\lim_{x \to 0} \frac{(x+8)^{\frac{1}{3}} - 2}{x} \tag{18}$$

$$Let, t = (x+8)^{\frac{1}{3}} \tag{19}$$

$$or, t^3 = x + 8 \tag{20}$$

$$or, x = t^3 - 8 \tag{21}$$

$$If, t^3 = x + 8 \tag{22}$$

$$or, t^3 = 0 + 8[Since, x \to 0] \tag{23}$$

$$or, t = 2 \tag{24}$$

So, when $x \to 0$, then $t \to 2$

$$Now, \lim_{x \to 0} \frac{(x+8)^{\frac{1}{3}} - 2}{x} \tag{25}$$

$$= \lim_{t \to 2} \frac{(t-2)}{(t^3-8)} \tag{26}$$

$$= \lim_{t \to 2} \frac{(t-2)}{(t-2)(t^2+2t+4)} \tag{27}$$

$$= \lim_{t \to 2} \frac{1}{(t^2+2t+4)} \tag{28}$$

$$= \frac{1}{2^2+2*2+2} \tag{29}$$

$$= \frac{1}{12}(Ans) \tag{30}$$

ANSWER TO THE PROBLEM NO: 5

$$\lim_{x \to +\infty} \frac{\sqrt{z^2+2}}{(3z-6)} \tag{31}$$

$$= \lim_{x \to +\infty} \frac{z\sqrt{1+\frac{2}{z^2}}}{3z(1-\frac{2}{z})} \tag{32}$$

$$= \frac{1}{3}(Ans) \tag{33}$$