December 12,2012

QUIZ♯4 Math102-sec14.

Net Time Allowed: 20 minutes

Name: ID ♯ : Serial ♯:

Exercise1: (10 pts)

Determine whether the series is convergent or divergent. If it is convergent, find its sum:

(a) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} + 2^n}{3^n}$ (07 pts)

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}+2^n}{3^n} \overset{01}{=} \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{3^n} + \sum_{n=1}^{\infty} \left(\frac{2}{3}\right)^n.$$

⊛ The Series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{3^n}$ is a Geometric Series with $r = -\frac{1}{3}$ (01), Therefore it is Convergent $(|r| = 1/3 < 1)$ and has Sum: $\sum_{n=1}^{\infty} \frac{1}{3}\left(-\frac{1}{3}\right)^{n-1} = \frac{1}{3} \cdot \frac{1}{1-(-\frac{1}{3})} = \frac{1}{4}$ (01) (01)

⊛ The Serie $\sum_{n=1}^{\infty} \left(\frac{2}{3}\right)^n$ is a Convergent Geometric Serie $(r = \frac{2}{3})$ with Sum $= 2$ (01)

Hence The Given Series is Convergent (01) with Sum: (01) $S = \frac{1}{4} + 2 = \frac{9}{4}$.

(b) $\sum_{n=1}^{\infty} n \sin \frac{1}{n}$ (03 pts)

$$\lim_{n\to\infty} n \sin\frac{1}{n} \overset{01}{=} \lim_{n\to\infty} \frac{\sin \frac{1}{n}}{\frac{1}{n}} \overset{01}{=} 1 \neq 0$$

Hence The Series is Divergent (01), By divergence Test.