Date: June 13, 2013, Thursday NAME:.....

STUDENT NO:.....

DEPARTMENT:.....

Math 102 Summer 2013 – QUIZ # 1 – Section 001

Let $a_n = \dfrac{\cos^2(n)}{2^n}$ for $n \geq 1$.

Determine whether the sequence $\{a_n\}_{n=1}^{\infty}$ converges or diverges.
If it converges, find the limit. Moreover determine if the series $\displaystyle\sum_{n=1}^{\infty} a_n$ diverges or converges.

Solution:

We have $0 \leq a_n \leq \dfrac{1}{2^n}$.

Since $\lim\limits_{n\to\infty} \dfrac{1}{2^n} = 0$, by the squeeze theorem, we laso have $\lim\limits_{n\to\infty} a_n = 0$.

Moreover since $\displaystyle\sum_{n=1}^{\infty} \frac{1}{2^n}$ converges as a geometric series, the above inequality shows that $\displaystyle\sum_{n=1}^{\infty} a_n$ converges by the comparison test.