

Name:

1. (3pts) Determine (and justify!) whether the sequence is convergent and divergent, and give the limit if it converges.

$$a_n = \frac{(1+n)(1+n^2)}{\cos(n) + n^3}$$

2. (3pts) Determine whether the series $\sum_{n=1}^{\infty} ne^{-n^2}$ is convergent or divergent.

3. (4pts) Determine whether the statement true or false. If false give a counterexample.

(a) (2pts) The sequence $\{a_n\}$ diverges, the sequence $\{b_n\}$ has the limit zero then $\{a_nb_n\}$ diverges.

(b) (2pts) The sequence a_n converges. The sequence b_n is monotonically increasing and $b_n \leq a_n$. Then the sequence $\{b_n\}$ converges.