Math 112
Quiz #12

1. Determine whether the following sequence is increasing decreasing or neither:

$$a_n = \frac{10^n}{n!}.$$

$$\frac{a_{n+1}}{a_n} = \frac{10^{n+1}}{(n+1)!} \cdot \frac{n!}{10^n} = \frac{10}{n}$$

If $n > 10$ this sequence is decreasing. However, the sequence as a whole is not decreasing.

2. Determine whether the following sequence is bounded:

$$a_n = \frac{\sin(n^2)}{n+1}.$$

$$\frac{-1}{n+1} < a_n < \frac{1}{n+1}$$

$$\Rightarrow \frac{-1}{2} < a_n < \frac{1}{2}$$

Therefore, a_n is bounded.