

You must always justify your answers. This means: show your work, show it neatly, and when in doubt, use words (and pictures!) to explain your reasoning. No justification = no points.

1. (10 pts) Determine whether the following series converges or diverges. If it converges, find the limit.

$$\sum_{n=1}^{\infty} \left( \cos \frac{\pi}{n+1} - \cos \frac{\pi}{n} \right)$$

2. (bonus) Explain why it's wrong to write:

$$\sum_{n=1}^{\infty} \left( \cos \frac{\pi}{n+1} - \cos \frac{\pi}{n} \right) = \left( \sum_{n=1}^{\infty} \cos \frac{\pi}{n+1} \right) - \left( \sum_{n=1}^{\infty} \cos \frac{\pi}{n} \right)$$