1. [**2 points**] Is the following statement true: If the sequence $(a_k)_{k=1}^{\infty}$ converges to 0 then the series $\displaystyle\sum_{k=1}^{\infty} a_k$ converges.

   If it is true, explain why. If it is false, provide a counterexample.

2. [**6 points**] For each series below, determine if the series is convergent.
   If the series converges, what does it converge to? Justify your answers.

   (a) $\displaystyle\sum_{k=2}^{\infty} \frac{k}{\ln(k)}$

   (b) $\displaystyle\sum_{k=0}^{\infty} \frac{2}{3^k}$

   (c) $\displaystyle\sum_{k=2}^{\infty} (-2)^k$

3. [**2 points**] Determine if the following series are convergent. State which test are you using.

   (a) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{k(\sqrt[100]{k})}$

   (b) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{\sqrt[3]{k}}$

   (c) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{k}$

Total: ⬚ /10