Due Tuesday, April 9, 2019.

1. True or False. Answer and briefly justify in each case.

(a) If $\lim\limits_{k\to+\infty} a_k = 5$ then the series $\sum\limits_{k=1}^{\infty} a_k$ is convergent to 5.

(b) If $\sum\limits_{k=1}^{\infty} a_k = 5$ then $\lim\limits_{k\to+\infty} a_k = 0$.

(c) If $a_k \leq k^{1/5}$ for all $k \geq 1$ then $\sum\limits_{k=1}^{\infty} a_k$ is convergent.

(d) The series $5 - 5 + 5 - 5 + 5 - 5 + \ldots$ is convergent to zero.

(e) If $\sum\limits_{k=1}^{\infty} a_k = 5$ and $\sum\limits_{k=1}^{\infty} b_k = 5$ then $\sum\limits_{k=1}^{\infty} (2a_k - b_k) = 5$.

2. Determine if each of the following series is convergent or divergent. Justify your answer

(a) $\sum\limits_{k=1}^{\infty} \dfrac{1}{1 + \sqrt{k}}$

(b) $\sum\limits_{k=2}^{\infty} \dfrac{1}{k(\ln k)^2}$

(c) $\sum\limits_{k=1}^{\infty} \dfrac{1}{\sqrt[k]{\pi}}$

(d) $\sum\limits_{k=2}^{\infty} \dfrac{\sqrt{k}}{k^2 + 1}$

(e) $\sum\limits_{k=0}^{\infty} \dfrac{3^k + 4^k}{4^k + 5^k}$

(f) $\dfrac{1}{1^2} + \dfrac{1}{2^2} - \dfrac{1}{3^2} + \dfrac{1}{4^2} + \dfrac{1}{5^2} - \dfrac{1}{6^2} + \ldots$