READ ME FIRST: Show me all the magic very neatly on the page, for I do not read minds. Use correct notation when presenting your computations and arguments. Use complete sentences. Remember this: "=" denotes "equals" , "$\Rightarrow$" denotes "implies" , and "$\Leftrightarrow$" denotes "is equivalent to". Since the answer consists of all the magic transformations, do not "box" your final results. Eschew obfuscation.

1. (4 pts.)   Use ratio test to determine whether the series converges, If the test is inconclusive, say so.

$$\sum_{k=1}^{\infty} \frac{3^k}{k!}$$

2. (4 pts.)   Use root test to determine whether the series converges. If the test is inconclusive, say so.

$$\sum_{k=1}^{\infty} \left(\frac{3k+2}{2k-1} \right)^k$$

3. (4 pts.)   Use comparison test to show the following series diverges.

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

4. (4 pts.)   Apply the divergence test and state what it tells you about each of the following series.

(a) $\sum_{k=1}^{\infty} \cos(k\pi)$

(b) $\sum_{k=1}^{\infty} \frac{1}{\sqrt{k}}$

5. (4 pts.)   Confirm that the integral test is applicable and then use it to determine whether the following series converges:

$$\sum_{k=1}^{\infty} \frac{1}{1+9k^2}$$