1. For each series (i) state your conclusion on convergence (absolute, conditional, divergence); (ii) state which test justifies your conclusion; and (iii) demonstrate how you used the test.

   (a) $\displaystyle\sum_{k=1}^{\infty} \frac{3^k}{\pi^k}$

   (b) $\displaystyle\sum_{k=1}^{\infty} \frac{(-1)^{k+1}}{2k}$

   (c) $\displaystyle\sum_{k=1}^{\infty} \frac{k!}{2^k}$

   (d) $\displaystyle\sum_{k=1}^{\infty} \frac{\sqrt{k}}{k-1}$

   (e) $\displaystyle\sum_{k=1}^{\infty} \frac{\sqrt{k}}{k+1}$

   (f) $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{(2n)!}$

2. For what values of x does

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

   converge. Explain your reasoning.

3. How many terms of the Maclaurin series for $\ln(1+x)$ are needed to estimate $\ln(1.5)$ to within 0.0001?

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