

Do the following converge or diverge?

1. $\sum_{k=5}^{\infty} \frac{2}{\sqrt{k+k}}$ Hint: Compare to $\sum \frac{1}{k}$

2. $\sum_{j=2}^{\infty} \frac{j^3}{4^j}$ Hint: Compare to $\sum \frac{1}{2^j}$

3. $\sum_{k=1}^{\infty} \frac{k!}{(k+2)!}$

4. $\sum_{k=2}^{\infty} \left(\frac{k+1}{3k^3+2k-12} + 1 \right)$