

Do the following series converge or diverge?

1. 
$$\sum_{k=98}^{\infty} \frac{3^k + \sin(k)}{\cos(k) + 5}$$

2. 
$$\sum_{k=1}^{\infty} \frac{2k^2 - 3}{5k^2 + 6k}$$

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

4. 
$$\sum_{k=2}^{\infty} \frac{1}{k^2}$$

Hint: Draw a picture comparing with  $\int_1^{\infty} \frac{1}{x^2} dx$ .

5. 
$$\sum_{k=1}^{\infty} \frac{1}{k}$$

Hint: Draw a picture comparing with  $\int_1^{\infty} \frac{1}{x} dx$ .