

Use the integral test to prove whether the following converge or diverge, recall from section 7.8 that you need not solve an integral to prove it converges.

1.
$$\sum_{k=1}^{\infty} e^{-k}$$

2.
$$\sum_{k=1}^{\infty} e^{-k^2}$$

3.
$$\sum_{k=1}^{\infty} \frac{\sqrt{k} + 4}{k^2}$$

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

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

6.
$$\sum_{k=1}^{\infty} \frac{k^{199}}{k^{200} - 1}$$

7.
$$\sum_{k=1}^{\infty} \frac{\sqrt{k}}{1 + k^{3/2}}$$

8.
$$\sum_{k=1}^{\infty} \frac{1}{k^2} \sin^2 \left(\frac{1}{k} \right)$$

9.
$$\sum_{k=1}^{\infty} e^{k^2}$$

10.
$$\sum_{k=2}^{\infty} \frac{k}{\ln k}$$

11.
$$\sum_{k=1}^{\infty} \frac{k}{k^4 + 1}$$

12.
$$\sum_{k=1}^{\infty} 5^{-k}$$