

Solutions

Each answer shows the steps, then the **result**.

2.1

- Positive, decreasing, and continuous for $x \geq 1$

2.2

- $\left[-\frac{1}{x}\right]_1^\infty = 0 - (-1) = 1$

2.3

- Yes — the integral converges, so the series converges

3.1 B

- with an improper integral of the matching function

3.2

(a)

- $\int_1^\infty x^{-3} dx = \left[-\frac{1}{2x^2}\right]_1^\infty = 0 + \frac{1}{2} = \frac{1}{2}$

(b)

- Converges

3.3

- $\int_2^\infty \frac{1}{x \ln x} dx$; $u = \ln x$, $du = \frac{1}{x} dx$; $= \int \frac{1}{u} du = \ln |u| = \ln(\ln x)$; as $x \rightarrow \infty$ this $\rightarrow \infty$,
so it **diverges**