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March 20, 2026

1 Determine whether the improper integral diverges or converges. Evaluate the integral if it converges.

$$\int_0^\infty \frac{e^x}{1+e^x} dx$$

2 Find the nth Taylor polynomial for the function, centered on c.

$$f(x) = \frac{1}{x^2}, n = 4, c = -2.$$

3 Use Taylor's theorem to obtain an upper bound for the error of the approximation. Then calculate the exact value of the error. Round the error to the fourth decimal place.

$$e \approx 1 + 1 + \frac{1^2}{2!} + \frac{1^3}{3!} + \frac{1^4}{4!} + \frac{1^5}{5!}$$