

1. Express the following series as a telescoping sum and evaluate its  $n$ th partial sum.

$$\sum_{n=1}^{\infty} \ln \left( \frac{n}{n+1} \right)$$

$$\sum_{n=2}^{\infty} \frac{\ln \left( 1 + \frac{1}{n} \right)}{\ln n \ln (n+1)}$$

2.

### Solving an Initial-Value Problem

Using the method of separation of variables, solve the initial-value problem

$$y' = (2x + 3)(y^2 - 4), \quad y(0) = -1.$$