31–38 ▪ Separation of variables and a trick known as **integration by partial fractions** can be used to solve the selection equation. For simplicity, we will consider the case $\frac{dp}{dt} = p(1-p)$, where $\mu - \lambda = 1$.

31. Separate variables.

32. Show that

$$\frac{1}{p(1-p)} = \frac{1}{p} + \frac{1}{1-p}$$

and rewrite the left-hand side.

33. Integrate the rewritten left-hand side.

34. Combine the two natural log terms into one using a law of logs.

35. Write the equation for the solution with a single constant c.

36. Exponentiate both sides and solve for p.

37. Using the initial condition $p(0) = 0.01$, find the value of the constant. Evaluate the limit of the solution as t approaches infinity.

38. Using the initial condition $p(0) = 0.5$, find the value of the constant. Evaluate the limit of the solution as t approaches infinity.