

## 4.7 Exercises

### Conceptual

1.

$$P(x) = \frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}}$$

$$1 - P(x) = 1 - \frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}} = \frac{1 + e^{\beta_0 + \beta_1 x} - e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}}$$

$$= \frac{1}{1 + e^{\beta_0 + \beta_1 x}}$$

$$\frac{P(x)}{1 - P(x)} = \frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}} \cdot (1 + e^{\beta_0 + \beta_1 x})$$

$$= e^{\beta_0 + \beta_1 x}$$

$$\ln \frac{P(x)}{1 - P(x)} = \beta_0 + \beta_1 x$$