11. let $y = \text{logit}(x) = \log \frac{x}{1-x}$

$$e^y = \frac{x}{1-x}$$

$$1 + e^y = \frac{1-x}{1-x} + \frac{x}{1-x}$$
$$= \frac{1}{1-x}$$

$$\frac{1}{1+e^y} = 1 - x$$

$$x = 1 - \frac{1}{1+e^y}$$
$$= \frac{e^y}{1+e^y}$$

12. $z = \beta_0 + \beta_1 x_1$

$p = \log(z)$

log odds of logistic when x increases by 2

$$z = \beta_0 + \beta_1 (x_1 + 2)$$
$$= \beta_0 + \beta_1 x_1 + 2\beta_1$$

∴ log odds increases by $2\beta_1$

The exact increase in probability is contingent on the original value of x, as well as the scale parameter of β_1.

As $x_i \to \infty$, $p \to 0$

As $x_i \to -\infty$, $p \to 1$