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$$Z = \beta X + b$$

$$P = \frac{1}{1 + e^{-z}}$$

$$1 + e^{-z} = \frac{1}{P}$$

$$e^{-z} \frac{1 - P}{P} = 1$$

Inverse

$$e^{z} \frac{P}{1 - P} = 1$$

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Odds Ratio in Logistic Regression

$$= e^z \quad \frac{P}{1 - P}$$

Take Log

$$\log(e^z) = \log\left(\frac{P}{}\right)$$

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$$= e^z \quad \frac{P}{1 - P}$$

Take Log

$$\log(e^z) = \log\left(\frac{P}{1 - P}\right)$$

$$Z = \log\left(\frac{P}{1 - P}\right)$$

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Odds Ratio in Logistic Regression

$$\frac{P}{1-P} = e^{z}$$

Take Log

$$\log\left(\frac{P}{1-P}\right) = \log\left(e^{z}\right)$$

$$\log\left(\frac{P}{1-P}\right) = z$$

$$\log\left(\frac{P}{1-P}\right) = \beta X + b$$

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$$\beta X + b = \log\left(\frac{P}{1 - P}\right)$$

$$\text{Odds Ratio} = \frac{P}{1 - P}$$