BWGHT 2

$$bwght = \beta_0 + \beta_1 \, mage + \beta_2 \, mage^2 + u$$

$$\hat{\beta}_1 = 97.36$$

$$\hat{\beta}_2 = -1.57$$

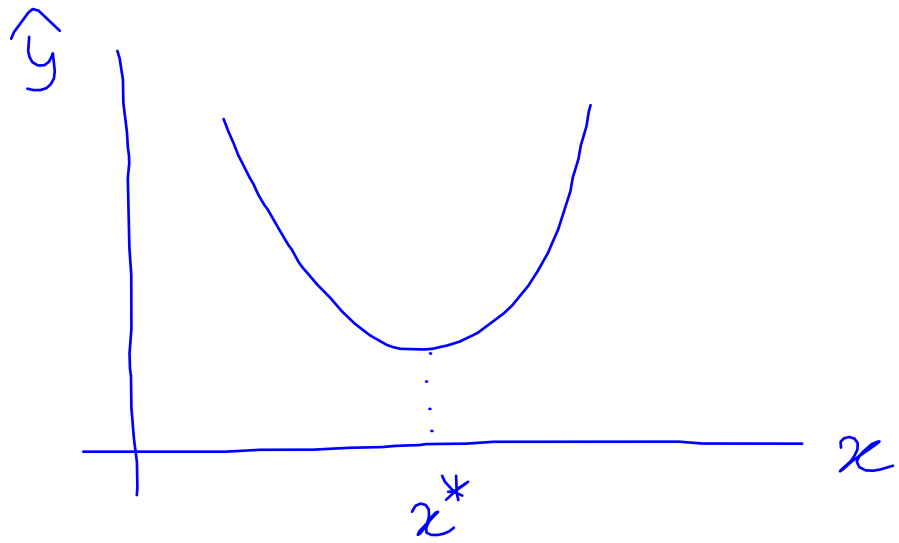
$$\frac{\Delta bwght}{\Delta mage} = \beta_1 + 2\beta_2 \, mage$$

at $mage = 25$: $97.36 + 2(-1.57)\,25 = 18.86$

$= 40$: $97.36 + 2(-1.57)\,40 = -28.24$

$$mage^* = \left| \frac{97.36}{2(-1.57)} \right| = 31.03 \text{ yrs.}$$

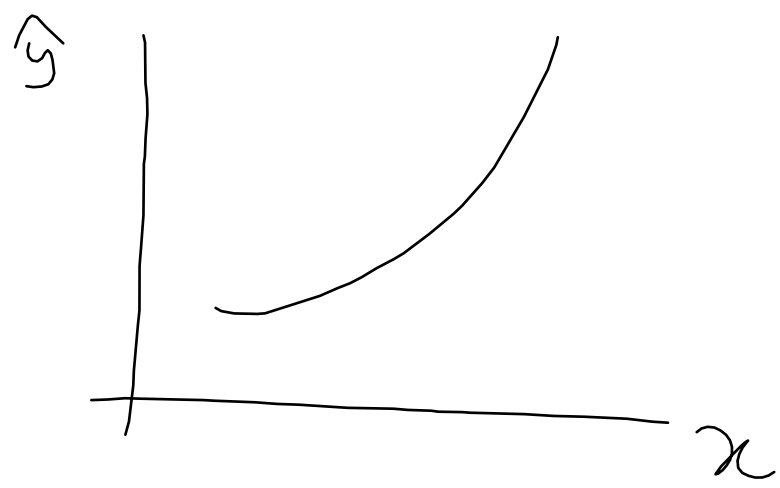
$\hat{\beta}_1 < 0$ and $\hat{\beta}_2 > 0$



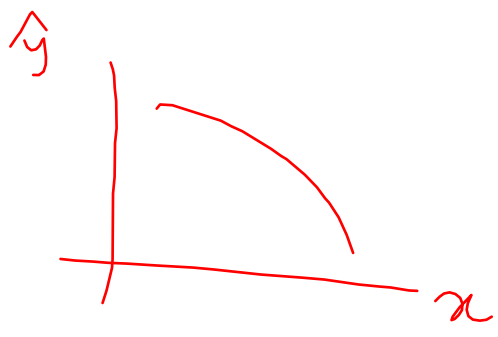
Turning pt. (min.)

at $x^* = \left| \dfrac{\hat{\beta}_1}{2\hat{\beta}_2} \right|$

$\hat{\beta}_1 > 0$ and $\hat{\beta}_2 > 0$



$\hat{\beta}_2 < 0$ and $\hat{\beta}_1 < 0$



Interaction Terms

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 \cdot x_2 + u$$

$$\frac{\Delta y}{\Delta x_1} = \beta_1 + \beta_3 x_2$$

$$\frac{\Delta y}{\Delta x_2} = \beta_2 + \beta_3 x_1$$

e.g. $\frac{\Delta y}{\Delta x_1}$ at $x_2 = \bar{x}_2$; $\frac{\Delta y}{\Delta x_2}$ at $x_1 = \bar{x}_1$

BWGHT2

$$bwght = \beta_0 + \beta_1 mage + \beta_2 npvis + \beta_3 mage \cdot npvis + u$$

$\hat{\beta}_1 = 28.65$ $\hat{\beta}_3 = -2.2$

$\hat{\beta}_2 = 78.98$

$$\frac{\Delta bwght}{\Delta mage} = \beta_1 + \beta_3 npvis$$

avg. = 11.62

at $\overline{npvis}$: $28.65 - (2.2 \times 11.62)$

$= 3.086$