4.1 We know that $\mu_w = 150$, $\sigma_w = 30$, $r = 0.8$
$\mu_a = 0.8$, $\sigma_a = 0.1$

a. Given $w_0 = 170$, find a_0 (assuming $\hat{a} = r\hat{w}$)

$$\frac{a^p - \mu_a}{\sigma_a} = \frac{r(w_0 - \mu_w)}{\sigma_w}$$

$$\Rightarrow a^p = \frac{r\sigma_a(w_0 - \mu_w)}{\sigma_w} + \mu_a$$

So, $a_0^p \approx 0.86$

b. Using the same procedure as above, but with $\hat{w} = r\hat{a}$, we find that $w_0^p \approx 136.5$

c. I expect it to be very reliable as the correlation coefficient is large at 0.8, which is greater than the 0.5 standard.

4.2 We know that $\mu_F = \$60,000$, $\sigma_F = \$20,000$
$\mu_I = 100$, $\sigma_I = 15$, $r = 0.3$

a. Using $I_0 = \$70,000$, find Q_0^p (assuming that $\hat{F} = r\hat{I}$)

$$\frac{F_0^p - \mu_F}{\sigma_F} = r \times \frac{I_0 - \mu_I}{\sigma_I}$$, so $Q_0^p \approx 102.25$

(continued)

4.2 b. Fairly unreliable, since the correlation coefficient is 0.3, a relatively low value when compared to the standard 0.5.

c. Assuming that the rise is speaking about a new, distinct family in the same sample set with a relatively larger family income ~~that~~ than a previous family, then yes the correlation is positive so a higher family income would indicate a higher IQ prediction. But it is important to ~~a~~ remember that correlation doesn't mean causation.