Section 3.1 PART II

Linear Correlation

r = linear correlation coefficient

Facts about r:

1) $-1 \le r \le 1$.
2) If $r = 1 \rightarrow$ The points are on a line of positive slope. If $r \approx 1$ the points are near a line of positive slope.
3) If $r = -1 \rightarrow$ The points are on a line of negative slope. If $r \approx -1$ the points are near a line of negative slope.
4) If $r \approx 0$ then no clear linear relationship exists between the variables.
5) If $r \approx 0$ there may be a non-linear relationship.

x = auto weapons	y = murder rate	x^2	y^2	xy
11.6	13.1	134.56	171.61	151.96
8.3	10.6	68.89	112.36	87.98
3.6	10.1	12.96	102.01	36.36
0.6	4.4	0.36	19.36	2.64
6.9	11.5	47.61	132.25	79.35
2.5	6.6	6.25	43.56	16.50
2.4	3.6	5.76	12.96	8.64
2.6	5.3	6.76	28.09	13.78
38.5 (Σx)	65.2 (Σy)	283.15 (Σx^2)	622.20 (Σy^2)	397.21 (Σxy)

$n = 8$

Compute r: (use the computational formula)

$$r = \frac{\Sigma xy - \frac{1}{n}(\Sigma x)(\Sigma y)}{\sqrt{\Sigma x^2 - \frac{1}{n}(\Sigma x)^2} \cdot \sqrt{\Sigma y^2 - \frac{1}{n}(\Sigma y)^2}} = \frac{397.21 - \frac{1}{8} \cdot 38.5 \cdot 65.2}{\sqrt{283.15 - \frac{1}{8} \cdot 38.5^2}\sqrt{622.2 - \frac{1}{8} \cdot 65.2^2}}$$

$= 0.885$ Round r to 3 sig. figures

Since $r \approx 1$, the points are near a line of positive slope.