11. Earning power
    a) $\hat{\$} = 2830 + 15300 gpa$
    b) Somewhat reliable; based on this model, differences in GPA explain only 52% of the variability in salaries.
    c) $51,440

12. Assembly line
    a) Weeks worked
    b) $r = -0.97$
    c) No. The residuals plot shows a distinct curve, and predictions about what will happen three weeks in the future are likely to be unreliable.

13. Associations
    –, C, +, –, N

14. Music and grades.
    a) In general, kids who studied music longer had higher GPA's.
    b) Disagree; association does not mean cause and effect. Perhaps the greater parental commitment that supports music lessons also encourages higher grades. (or higher SES enhances both, or people who are better students anyway take music, etc.)

15. Gas mileage again
    a) 89
    b) –0.78
    c) 3.3 mpg

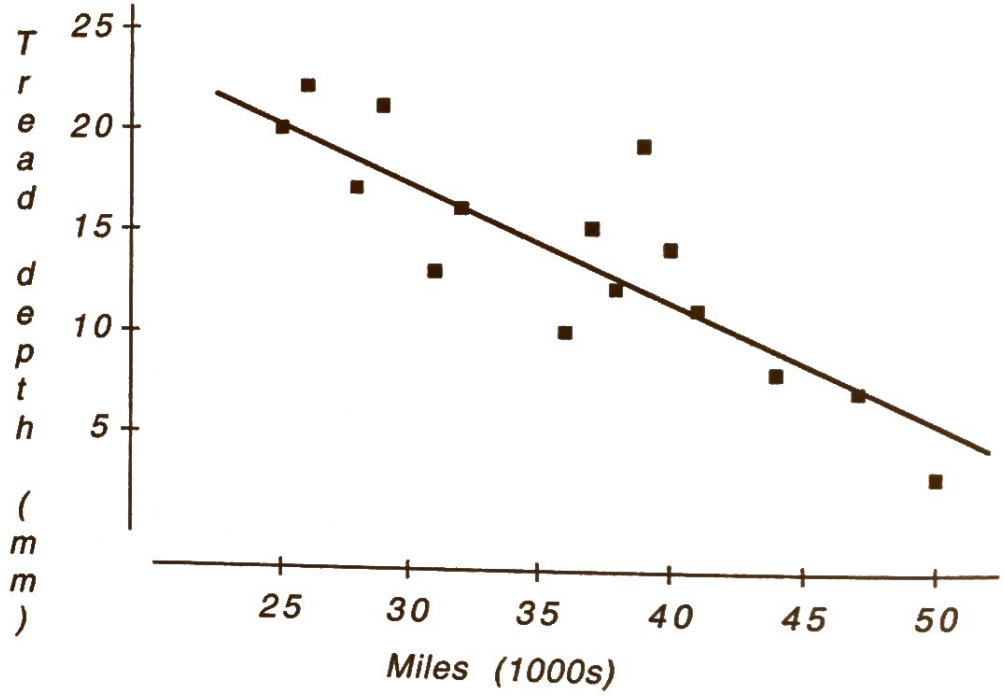
16. Crawling
    a) Plot 2 points; for example (30,33.6) and (70,30.4)
    b) The association is linear, moderately strong, and negative, with one outlier. Children seem to crawl earlier when the temperature is higher, though there was an unusually early age observed for a temperature just above 50°.
    c) The model suggests that, on average, babies crawl 0.8 weeks earlier for every 10° higher the temperature is.
    d) The model predicts that at a temperature of 0° babies would crawl at an average of 36 weeks old (though this may not mean much as no data were collected at such cold temperatures.)
    e) 49% of the variability in crawling age can be explained by variations in temperature.
    f) A negative residual would indicate that babies crawled at a younger age than the model predicted.

14. Taxi tires

a. Draw the line of best fit on the graph.
Method: Use model
$\hat{tread} = 36 - 0.6miles$
With 25000 miles,
36 - (0.6 * 25) = 21 (25, 21)

With 35000 miles,
36 - (0.6 * 35) = 15 (35, 15)

With 45000 miles,
36 - (0.6 * 45) = 9 (45, 9)



Model goes through points: (25, 21), (35, 15), and (45, 9).

b. The explanatory variable is the number of miles tires had been driven (in thousands).

c. The correlation must have the same sign (+/-) as the slope. $r = \sqrt{r^2} = \sqrt{0.74} = -0.86$

d. The association between the number of miles tires have been driven (in thousands) and the tire tread depth (in mm) is a moderately strong negative linear relationship. This means that as the number of miles increases, the tire tread depth will decrease in a consistent manner in general. (In this model, the tire tread will decrease an additional 0.6 mm for every additional 1000 miles the tires are driven.) One tire had unusually deep tread for the number of miles it had been driven (38000 miles, 20 mm).

e. This model suggests that for every additional 1000 miles the tires are driven, the depth of the tire tread will decrease by 0.6 mm, on average.

f. The model predicts that brand new tires (number of miles equals zero) have tread averaging 36 mm deep.

g. r^2 means that 74% of the variability in tread depth is explained by the variations in the number of miles the tires have been driven.

h. Residual equals the observed tread depth minus the predicted tread depth. A negative residual means that the observed amount of tread depth is less than the predicted amount of tread depth, using this model. This means that the tire tread is actually wearing out faster than the model predicts.