Book Club

1. The president of a book club is concerned about the low attendance at the club's most recent book discussion. He wonders whether the considerable length of the books is to blame.
For each of the last few books that club members chose, the president notes the number of pages, x, as well as the n umber of people who attended the discussion, y.

The least squares regression line of this data set is $\hat{y} = 26.666 - 0.016x$

a) If a book has one additional page, the least squares regression line predicts _____ fewer people will attend the discussion.

0.016 fewer people (y) per one page (x). Also, you could say -0.016 people.

b) If a book has 50 fewer pages, what is the predicted change in attendance?

-0.016 people x 50 pages = -0.8 people, or 0.8 fewer people

c) What does the y-intercept indicate? Is it useful?

At x = 0, meaning a book has 0 pages, y = 26.666 people attending. This is not useful, as a 0-page book does not exist.

d) If the next book chosen has 350 pages, how many people would the president except to show up?

We could predict this with $\hat{y} = 26.666 - 0.016\ (350) = 21.066$ attendees

e) After assigning a book with 400 pages, the president is pleasantly surprised to see 25 people attend the meeting. What was the residual?

The residual is the difference between the actual and predicted values, $e = y - \hat{y}$

So, $e = 25 - 21.066 = 3.934$ people

2. The president opens a new chapter of the club specifically for people who read manga. He observes several meetings and keeps track of the length of the assigned manga and the attendance for that meeting.

The least squares regression line of the manga data set is $\hat{y} = 25.08 + 0.024x$

a) Describe the difference between the regular book club attendance-to-page relationship with that of the manga club.

The regular book club has a negative relationship (negative slope) between pages and attendance, while the mange book club has a positive relationship (positive slope).

b) For each additional page of manga, how does attendance change?

The slope is 0.024, so for each page of manga increased the attendees increase by 0.024.

c) For 20 pages additional pages of manga, how does attendance change?

We multiply the slope by 50. 50*0.024 = 1.2 more attendees

d) How many pages of increase would result in two extra attendees?

Tricky! We would flip the above calculation and do P*0.024 = 2 with P = number of pages. Solving for $P = \frac{2}{0.024} = 83.333$ pages more of manga could result in two more attendees.

e) If a manga has 3050 pages, how many people will attend the bookclub? Is this sus?

$\hat{y} = 25.08 + 0.024\ (3050) = 98.28$ attendees

That's a lot of pages, and it would be surprising if this club's attendance were increased by a factor of four just because of mange length. Slightly sus.