

CP Algebra 2
Linear Regression

Name: Key

The following values in the table are the years of life expectancy at birth (averages of males and females together). Source: National Center for Health Statistics (www.cdc.gov/nchs)

Year	Life Expectancy (in years)
1985	74.7
1986	74.7
1987	74.9
1988	74.9
1989	75.1
1990	75.4
1991	75.5
1992	75.8
1993	75.5
1994	75.7
1995	75.8
1996	76.1
1997	76.5
1998	76.7
1999	76.7
2000	77
2001	77.2
2002	77.3
2003	77.5
2004	77.9

Calculator

LinReg

$$y = ax + b$$

$$a = 0.1659398496$$

$$b = -254.9220301$$

$$r^2 = 0.9724877793$$

$$r = 0.9861480514$$

- 1.) What is the equation of the line using the year (x) to predict life expectancy (y) ?

$$y = 0.166x - 254.922$$

- 2.) Predict what the life expectancy will be in 2015, 2020, and 2025 based on this data?

$$2015 \rightarrow y = 0.166(2015) - 254.922 = 79.57$$

$$2020 \rightarrow y = 0.166(2020) - 254.922 = 80.40$$

$$2025 \rightarrow y = 0.166(2025) - 254.922 = 81.23$$

- 3.) In what year should the life expectancy increase to 85? Age 90?

$$85 = 0.166x - 254.922$$

$$339.922 = 0.166x$$

$$2047.72 = x$$

$$90 = 0.166x - 254.922$$

$$344.922 = 0.166x$$

$$2077.84 = x$$

- 4.) What is the correlation coefficient? Is the line you found a solid or poor representation of your data?

$$r = 0.986 \quad \text{close to } 1 \dots \text{good line!}$$

- 5.) List some factors that could affect the accuracy of life expectancy statistics in the future.

Better diets, Better health care,
Better vitamins, etc.

The following chart gives the average price (\$) per gallon of regular unleaded gasoline for twenty-four consecutive months.

Month	Price (\$)
1	2.90
2	2.88
3	2.93
4	2.88
5	2.51
6	2.25
7	2.19
8	2.34
9	2.24
10	2.17
11	2.63
12	2.85
13	3.10
14	3.09
15	2.89
16	2.76
17	2.80
18	2.88
19	3.09
20	3.01
21	3.11
22	3.13
23	3.26
24	3.37

Calculator:

Lin Reg

$$y = ax + b$$

$$a = .0284869565$$

$$b = 2.446413043$$

$$r^2 = 0.3319163821$$

$$r = .5761218465$$

- 1.) What is the equation of the line using the month (x) to predict the price of gasoline (y)?

$$y = 0.0285x + 2.4464$$

- 2.) Predict what the cost of gasoline will be, per gallon, in the 100th month.

$$y = 0.0285(100) + 2.4464$$

$$y = 5.2964$$

~~4.00~~ \approx \$5.30/gallon

- 3.) In what year should the cost of gas reach \$4.00 per gallon? \$5.00 per gallon?

$$4.00 = 0.0285x + 2.4464$$

$$1.5536 = 0.0285x$$

$$54.51 = x$$

$$5.00 = 0.0285x + 2.4464$$

$$2.5536 = 0.0285x$$

$$89.6 = x$$

55th year

90th year

- 4.) What is the correlation coefficient? Is the line you found a solid or poor representation of your data?

$$r = 0.576$$

... poor representation
(not between 0.8 and 1)