1. The cost of fuel consumed by a truck was assumed to be linearly related to the travel distance and the load carried. Over a certain period, the following data was recorded by the driver. Obtain the underlying relationship (add the constraint that there is no cost when both the distance and the load are zero). How good is the assumption that the relationship is linear?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Distance (km)* | 88 | 210 | 320 | 88 | 210 | 320 | 245 | 65 |
| *Load Factor* | 0.33 | 0.42 | 0.50 | 0.17 | 0.28 | 0.67 | 0.32 | 1.00 |
| *Cost (Rs.)* | 140 | 270 | 400 | 110 | 250 | 450 | 280 | 225 |

2. It is known that bacteria swim against the concentration gradient of the food. The following data were measured for the concentration gradient of the food and the corresponding speed of swim:

Conc. Grad., *x*, (μmol/cm) 0.1 0.2 0.5 1.3 4.2 9.5

Speed, *y*, (μm/min) 2.85 4.00 6.00 10.00 15.00 20.00

It was decided to fit the equation,  to the data. a) Obtain least square estimates of *a* and *b*; b) Calculate *r2* for the non-linear fit; c) Graphically compare the data values with the fitted curve.