

## MS Module 18 Units of measurement practice exam questions

(The attached PDF file has better formatting.)

[The practice problems in the 24 modules explain the statistical procedures; the practice exam questions in this thread shows what you will be asked on the final exam.]

An actuary in the United States uses least squares regression with  $N$  pairs of observations  $(X_i, Y_i)$  to estimate average annual claims cost in *dollars* per average distance driven per day in *miles*, giving

annual claim costs ( $Y$ ) in dollars =  $\beta_0 + \beta_1 \times$  distance driven ( $X$ ) in miles +  $\epsilon$ , with  $\beta_0 = 70$  and  $\beta_1 = 13.1$

A European actuary changes the parameters to annual claims costs in Euros and distance driven per day in kilometers. Assume one Euro = 1.66 dollars and 1 kilometer = 0.625 miles.

Question 18.1:  $\beta_0$

What is  $\beta_0$  in the European actuary's regression equation?

Answer 18.1:  $70 / 1.66 = 42.17$

(\$70 = €42.17)

Question 18.2:  $\beta_1$

What is  $\beta_1$  in the European actuary's regression equation?

Answer 18.2:  $13.1 \times 0.625 / 1.66 = 4.93$

( $13.1$  (dollars/mile)  $\times$  (0.625 miles per kilometer) / (1.66 dollars per Euro) = 4.93 (Euros/kilometer) )