

Name: _____

Show work needed to justify your answer.

Date: _____

HW: # 30: Math IBSL - Standard 29 - Least Squares Regression

5 points

- 4 This table shows both the time, in seconds, which it takes for 10 cars to accelerate from 0 km h^{-1} to 90 km h^{-1} , and the maximum speed of the car.

0 to 90 time (seconds)	6	7	8	8.5	9	9.5	10	11	11.5	12
Max speed (km hr^{-1})	157	155	147	142	138	132	134	127	120	115

- a Find Pearson's product-moment correlation coefficient (r) for this data.
 b Find the equation of the y on x regression line.
 c Use this equation to estimate the maximum speed of a car that takes 7.5 seconds to accelerate from 0 km h^{-1} to 90 km h^{-1} .
 d Interpret the meaning of the gradient of the regression line in this context.

a) $r = -0.988$

b) $y = -7.08x + 202.2$

c) $y = -7.08(7.5) + 202.2$
 $y = 149 \text{ kmh}^{-1}$

d) For every increase of one second in the $0 \rightarrow 90$ time, the max speed decreases by 7.08 kmh^{-1}

- 7 At low tide, mud banks are exposed on both sides of a river. Sonny recorded the number of mudbugs at various distances from the river's edge.

Distance (m)	0.5	1	1.5	2	2.5	3	4
Number of mudbugs	30	28	14	18	10	7	1

Sonny uses his GDC to model the relationship between the variables by a regression equation of the form $y = ax + b$.

- a Write down the values of a and b .
 b Hence, estimate the number of mudbugs, to the nearest whole number, that are 3.5 m from the river's edge.
 c Find Pearson's product-moment correlation coefficient (r) for this data.
 d State which two of these words best describe the correlation between Sonny's variables: strong, zero, positive, negative, no correlation, weak.

a) $a = -8.46$ $b = 33.0$

b) $y = -8.46(3.5) + 33$
 $y \approx 3$

c) $r = -0.952$

d) STRONG Negative.