An experiment to study the relationship between the time spent exercising (x, in minutes) and the amount of oxygen consumed during the exercise period (y, in cm^3) resulted in the following summary statistics.

$n = 20$	$\sum_i x_i = 50$	$\sum_i y_i = 16705$
$\sum_i (x_i - \bar{x})^2 = 25$	$\sum_i (y_i - \bar{y})^2 = 241379.8$	$\sum_i (x_i - \bar{x})(y_i - \bar{y}) = 2431.5$

Assume that a simple linear regression model $y = \beta_0 + \beta_1 x + \epsilon$ is adequate.

1. Compute the least squares estimates $\hat{\beta}_0 = b_0$, $\hat{\beta}_1 = b_1$, and the variance estimate $\hat{\sigma}^2 = s^2$.

   Solution: $b_1 = 2431.5/25 = 97.26$, $b_0 = 16705/20 - 97.26(50)/20 = 592.1$, SSE$=241379.8 - (2431.5)^2/25 = 4892.11$, $s^2 = 4892.11/18 = 271.78$.

2. Construct a 95% confidence interval for the slope β_1.

   Solution: $97.26 \pm 2.101\sqrt{271.78/25}$, or $(90.33, 104.19)$.

3. You are about to spend 3 minutes on a weight machine. Predict your oxygen consumption during the 3 minute period using a 95% prediction interval.

   Solution: $\hat{y} = 592.1 + 97.26(3) = 883.88$, $\bar{x} = 50/20 = 2.5$. A 95% PI is $883.88 \pm 2.101\sqrt{271.78(1/20 + (3 - 2.5)^2/25 + 1)}$, or $(848.22, 919.54)$.