Sample 1

Problem 1

The RCMP assume that people consistently drive over the average speed limit of 100 km. Constable Bob, who also believes that drivers consistently speed, decides to detect the speed of 15 randomly passing cars to test his beliefs.

Data				
104	**110**	**115**	**120**	**110**
109	**112**	**115**	**103**	**105**
99	**95**	**100**	**100**	**105**

Are the RCMP and constable Bob correct?

Use SPSS to answer the question.

SCHOLARLY WRITINGS

a. Follow the four steps for hypothesis testing. Use α = .05. (10 points)

Hypotheses

Null hypothesis ($\mathbf{H_0}$): The average speed of drivers is 100 km/h or less.

Alternative hypothesis ($\mathbf{H_1}$): The average speed of drivers exceeds 100 km/h.

The null hypothesis is rejected. The *p*-value exceeds the significance level (α) of 0.05. The one-sample *t*-test reveals that the sample mean of randomly passing cars (M = 106.8, SD = 6.98) significantly differs from the hypothesized 100km/h, $t(14) = 3.77$, $p < 0.05$.

Output

One-sample test results

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Speed	15	106.8	6.98161	1.80264

One-Sample Test

	Test Value = 100					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Speed	3.772	14	.002	6.8	2.9337	10.6663

The statistically significantly finding rejects the null hypothesis. This finding implies that there is sufficient evidence proving that the average speed exceeds 100 km/h based on the speed of 15 randomly passing cars.

b. Compute the effect size using r^2. (2 points)

$$r^2 = \frac{t^2}{df} = \frac{3.772^2}{14} = 1.02$$

c. Calculate the point estimate for μ. (2 points)

The SPSS outputs show that the point estimate for μ is 106.8km/h. This point estimate represents the sample mean.

d. Calculate the 95% confidence interval for μ. (2 points)

The one-sample test output shows that the 95% confidence intervals for μ are: (100 + 2.93) and (100 + 10.67), which are 102.93km/h and 110.67km/h.