

You have 25 minutes. Take your time!
Note that this sheet has **two sides**.

Name: A. Student

You're working as a technician at a tree seedling nursery in some lonely place in Canada. Your job is quality control on seedlings to make sure they meet height standards.

QUESTION ONE: You've measured 36 trees randomly in the batch. You process the data, and calculate the mean height to be 70 cm and the sample standard deviation to be 3.6 cm. You summarize the data below:

i) n is called the sample size and is equal to 36

ii) \bar{x} is called the sample mean and is equal to 70 cm

iii) s is called the sample std. deviation and is equal to 3.6 cm

iv) $s_{\bar{x}}$ is called the standard error of the mean and is equal to 0.6 cm

QUESTION TWO: You are required under contract to grow 2-year-old jack pine seedlings with a mean height greater than 68 cm. So you plan on using a statistical hypothesis test to see if your batch meets the criteria. Write the hypotheses below.

Ho:	$\mu = 68$ $\mu = 68$
Ha:	$\mu > 68$

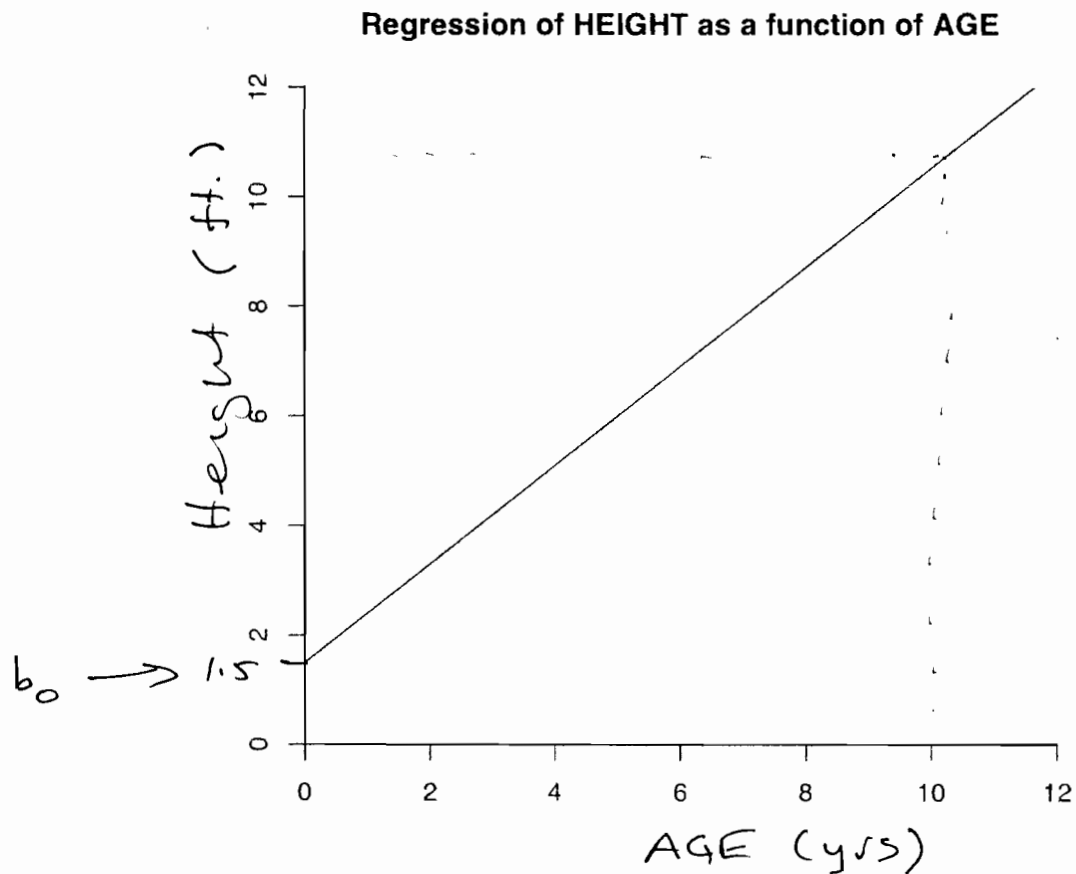
QUESTION THREE: Here are a couple of giveaways.

$$|t_{(0.025,35)}| = 2.03 \quad |t_{(0.05,35)}| = 1.69$$

Calculate the lower and upper 95% confidence limits for the mean.

$$\begin{aligned}
 & 70 \pm 2.03 \cdot (0.6) \\
 & = 70 \pm 1.218 \\
 & = \begin{aligned} \text{UCL} &= 71.2 \\ \text{LCL} &= 68.8 \end{aligned}
 \end{aligned}$$

QUESTION FOUR: A simple linear regression analysis was performed on data collected from young red pine stands. These stands were all planted with trees that were three years old at the time of planting. Total height (in feet) and age (in years since planting) were measured on 75 trees. Below is a plot of the fitted regression line.



1. Label the axes fully.
2. What are the estimates for the slope and intercept, approximately? Write the equation for the line including these values.

$$\text{intercept} = b_0 = 1.5$$

$$\text{slope} = b_1 = \frac{\text{rise}}{\text{run}} = \frac{10.5 - 1.5}{10} = 0.9$$

$$\text{So } \hat{y} = 1.5 + 0.9 \cdot \text{age}$$

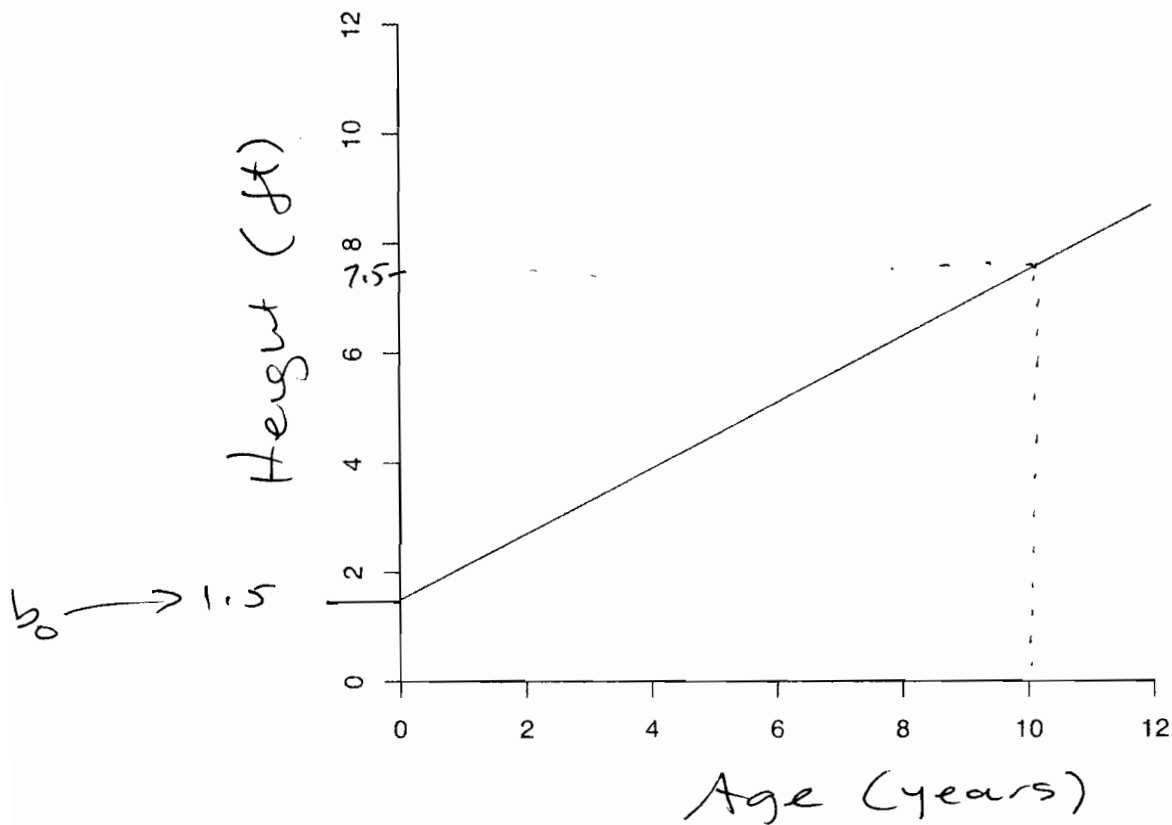
3. (a) What is the predicted height for a 10-year-old tree, approximately? (b) Plot and label the point on the figure.

$$= 1.5 + 0.9(10)$$

$$= 10.5 \text{ ft.}$$

QUESTION FOUR: A simple linear regression analysis was performed on data collected from young red pine stands. These stands were all planted with trees that were three years old at the time of planting. Total height (in feet) and age (in years since planting) were measured on 75 trees. Below is a plot of the fitted regression line.

Regression of HEIGHT as a function of AGE



1. Label the axes fully.
2. What are the estimates for the slope and intercept, approximately? Write the equation for the line including these values.

$$\text{Intercept} = b_0 = 1.5$$

$$\text{slope} = b_1 = \frac{\text{rise}}{\text{run}} = \frac{7.5 - 1.5}{10} = 0.6$$

$$\text{So } \hat{y} = 1.5 + 0.6(\text{age})$$

3. (a) What is the predicted height for a 10-year-old tree, approximately? (b) Plot and label the point on the figure.

$$= 1.5 + 0.6(10)$$

$$= 7.5 \text{ feet}$$