

NAME: \_\_\_\_\_

DATE: 01/18/2018

**ASSIGNMENT: Z-scores and Standardized Normal Distributions**

**DIRECTIONS:**

To convert your data to this standard form, utilize the formula:

$$z = \frac{x - \mu}{\sigma} \quad \text{where } x \text{ is your unconverted data point, } \mu \text{ is your population mean,}$$

and  $\sigma$  is your population standard deviation

To reverse direction and find the value corresponding to a probability:

$$X\text{-value} = \text{norminv}(\text{probability, mean, standard deviation})$$

1.)

*[Maximum mark: 9]*

The heights of trees in a forest are normally distributed with mean height 17 metres. One tree is selected at random. The probability that a selected tree has a height greater than 24 metres is 0.06.

- (a) Find the probability that the tree selected has a height less than 24 metres. *[2 marks]*
  
- (b) The probability that the tree has a height less than  $D$  metres is 0.06. Find the value of  $D$ . *[3 marks]*
  
- (c) A woodcutter randomly selects 200 trees. Find the expected number of trees whose height lies between 17 metres and 24 metres. *[4 marks]*

2.)

*[Maximum mark: 6]*

The speeds of cars at a certain point on a straight road are normally distributed with mean  $\mu$  and standard deviation  $\sigma$ . 15 % of the cars travelled at speeds greater than  $90 \text{ kmh}^{-1}$  and 12 % of them at speeds less than  $40 \text{ kmh}^{-1}$ . Find  $\mu$  and  $\sigma$ .

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**Answer key (show all calculations, inputs, and/or labeled diagrams)**

- 1.) a) label a diagram; you can do this  
b) 10 m  
c) 88 trees

2.)  $\sigma = 22.6 \text{ kmh}^{-1}$  ;  $\mu = 66.6 \text{ kmh}^{-1}$