Statistics Unit 1 worksheet: The normal distribution

Name _____ Date _____ Period _____

1. A spreadsheet guide gives the model for the lengths of cucumbers from one greenhouse, in centimeters, as $N(34, 4)$, with a note that it writes the variance second.

(a) Write the model in this lesson's notation, $N(\mu, \sigma)$.

(b) Where are the inflection points of the curve?

(c) A reader misses the note and takes 4 as the standard deviation. Where would the inflection points of the reader's curve be, and how would its peak height compare with the true curve's?

2. The diameters of buttons from one machine are modeled by $N(4.0, 0.25)$, in centimeters.

(a) Find the height of the peak of the curve, to three significant figures.

(b) A student says, "So the model says 160% of the buttons are 4.0 cm across." Explain the mistake.

(c) What share of buttons does the model give with diameters less than 4.0 cm?

3. A firewood seller charges a delivery fee of 19 dollars plus 4 dollars per kilogram of wood. The charges for her deliveries are modeled by $N(199, 24)$, in dollars.

(a) Find the model for the masses of wood in her deliveries, in kilograms.

(b) Where are the inflection points of the curve for the masses?

(c) How does the peak height of the curve for the charges compare with that of the curve for the masses?

4. Decide whether a normal model is reasonable for each variable, and explain.

(a) The number of books each student at a school borrowed from the library last month: mean 1.5, standard deviation 1.5.

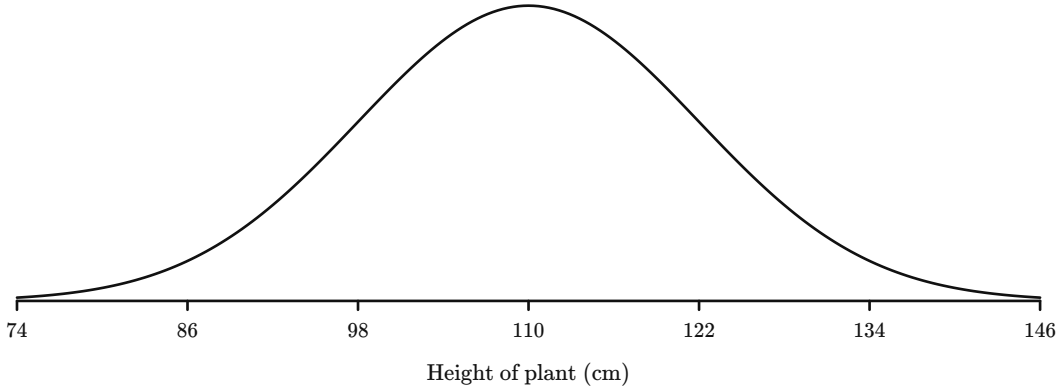
(b) Scores on a vocabulary quiz marked out of 20: mean 18, standard deviation 2.

(c) Finishing times at a 5 km charity event in which about half the entrants ran and half walked.

(d) Lengths of adult salmon caught in one river: mean 70 cm, standard deviation 5 cm, with a histogram that is a single symmetric hump.

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5. The figure shows the normal model for the heights of sunflower plants eight weeks after sowing, in centimeters. The curve is drawn from three standard deviations below the mean to three standard deviations above it, and the tick marks are equally spaced.



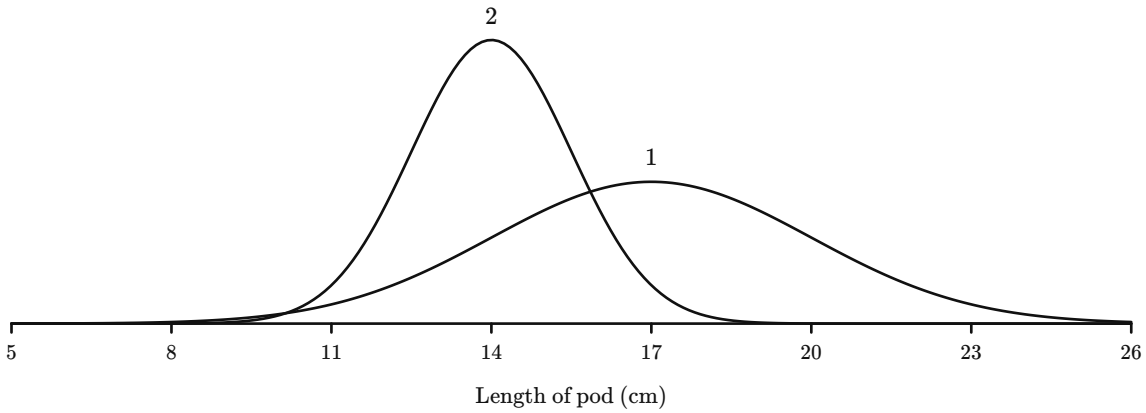
(a) Read μ and σ from the figure, saying which features you used. Above which heights are the inflection points?

(b) Find the height of the peak, to three significant figures, with its unit.

(c) The model gives a share of about 0.248 of plants between 110 and 118 cm tall. What share does it give taller than 118 cm? Shorter than 102 cm? Between 102 and 118 cm?

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6. Two varieties of bean are grown side by side. The lengths of their pods, in centimeters, are modeled by $P = N(14, 1.5)$ and $Q = N(17, 3)$. The figure shows both curves, labeled 1 and 2.



(a) Which curve is P? Give two features of the curves that show it.

(b) Give the inflection points of each curve. One of them sits directly below the other curve's peak: which one?

(c) Find the peak height of each curve, to three significant figures. How many times as tall as Q's peak is P's, and why must it be?

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