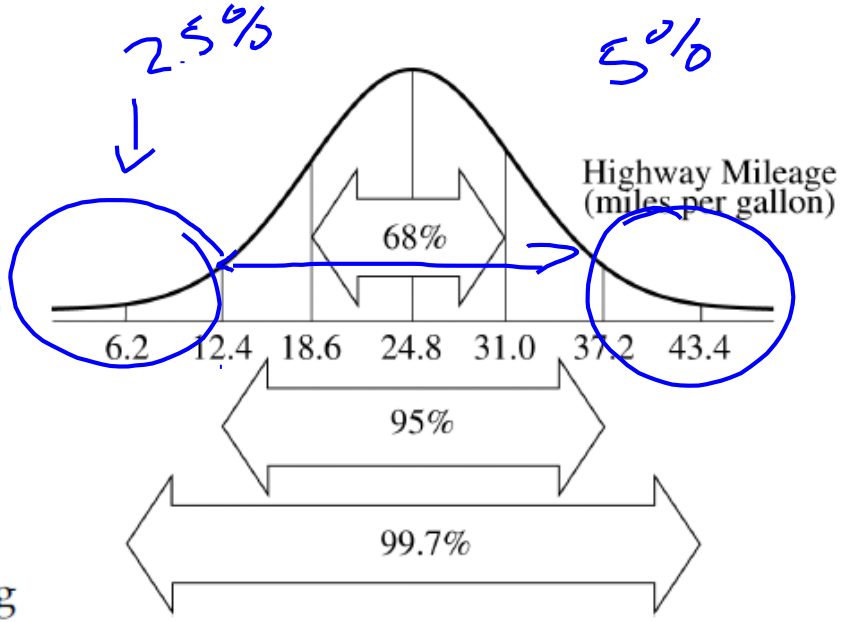
Tuesday, September 11, 2018

- Warm-up
  - Draw the models for each of the following:
    - Assume adult male heights are normally distributed with mean 70 inches and standard deviation 4 inches. Assume also that adult female heights are normally distributed with mean 65 inches and standard deviation 3.5 inches.
- Check Homework
- More with normal distribution

Content Objective: I will use the normal distribution to standardize scores.
Social Objective: I will participate in the class activities.
Language Objective: I will use correct vocabulary such as mean, standard deviation, standard score, percentile, z-score and distribution correctly both written and spoken.

Check Homework: Page 131 #25, 26, 29, 30

25. Guzzlers?



a) The Normal model for auto fuel economy is at the right.

b) Approximately 68% of the cars are expected to have highway fuel economy between 18.6 mpg and 31.0 mpg.

c) Approximately 16% of the cars are expected to have highway fuel economy above 31 mpg.

d) Approximately 13.5% of the cars are expected to have highway fuel economy between 31 mpg and 37 mpg.

e) The worst 2.5% of cars are expected to have fuel economy below approximately 12.4 mpg.

Check Homework: Page 131 #25, 26, 29, 30

26. IQ.

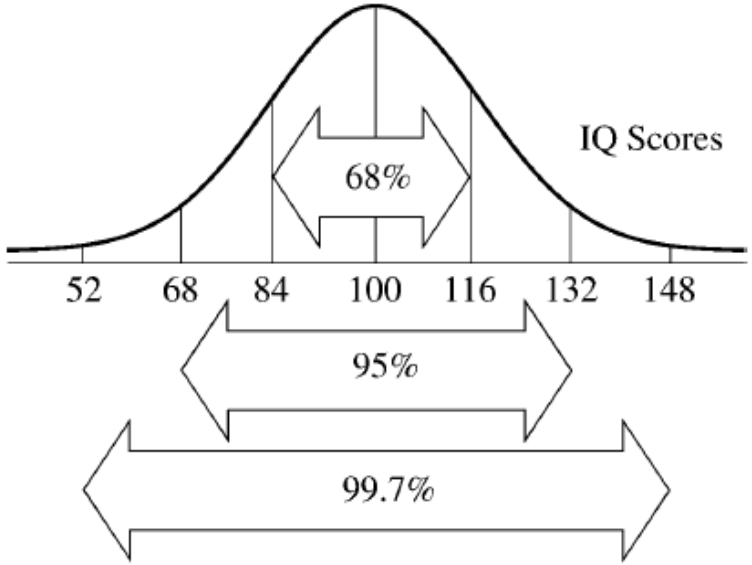
a) The Normal model for IQ scores is at the right.

b) Approximately 95% of the IQ scores are expected to be within the interval 68 to 132 IQ points.

c) Approximately 16% of IQ scores are expected to be above 116 IQ points.

d) Approximately 13.5% of IQ scores are expected to be between 68 and 84 IQ points.

e) Approximately 2.5% of the IQ scores are expected to be above 132.



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29. Trees.

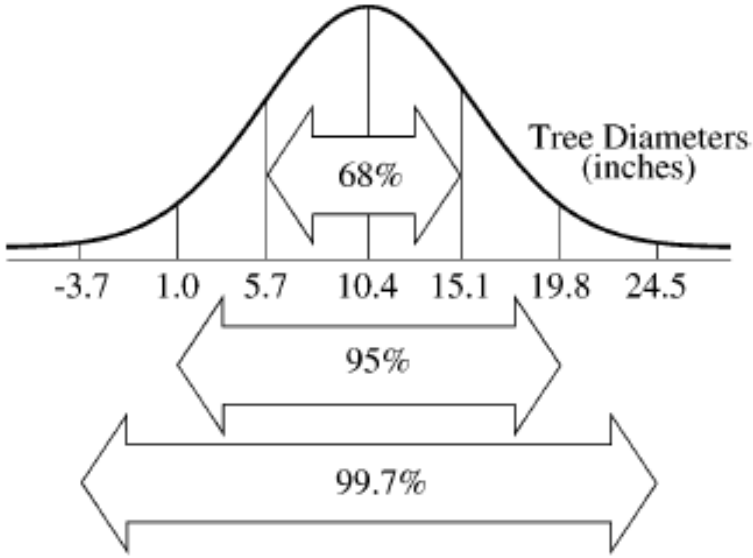
a) The Normal model for the distribution of tree diameters is at the right.

b) Approximately 95% of the trees are expected to have diameters between 1.0 inch and 19.8 inches.

c) Approximately 2.5% of the trees are expected to have diameters less than an inch.

d) Approximately 34% of the trees are expected to have diameters between 5.7 inches and 10.4 inches.

e) Approximately 16% of the trees are expected to have diameters over 15 inches.



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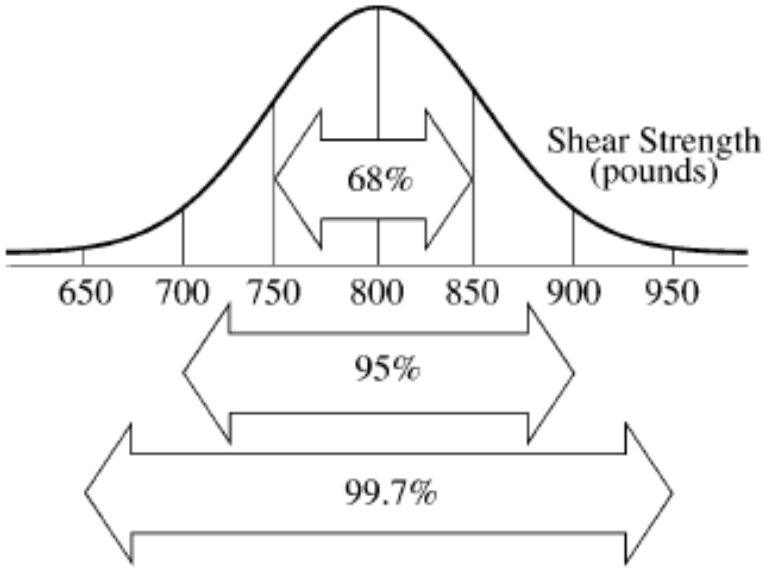
30. Rivets.

a) The Normal model for the distribution of shear strength of rivets is at the right.



b) 750 pounds is 1 standard deviation below the mean, meaning that the Normal model predicts that approximately 16% of the rivets are expected to have a shear strength of less than 750 pounds. These rivets are a poor choice for a situation that requires a shear strength of 750 pounds, because 16% of the rivets would be expected to fail. That's too high a percentage.

c) Approximately 97.5% of the rivets are expected to have shear strengths below 900 pounds.

d) In order to make the probability of failure very small, these rivets should only be used for applications that require shear strength several standard deviations below the mean, probably farther than 3 standard deviations. (The chance of failure for a required shear strength 3 standard deviations below the mean is still approximately 3 in 2000.) For example, if the required shear strength is 550 pounds (5 standard deviations below the mean), the chance of one of these bolts failing is approximately 1 in 1,000,000.

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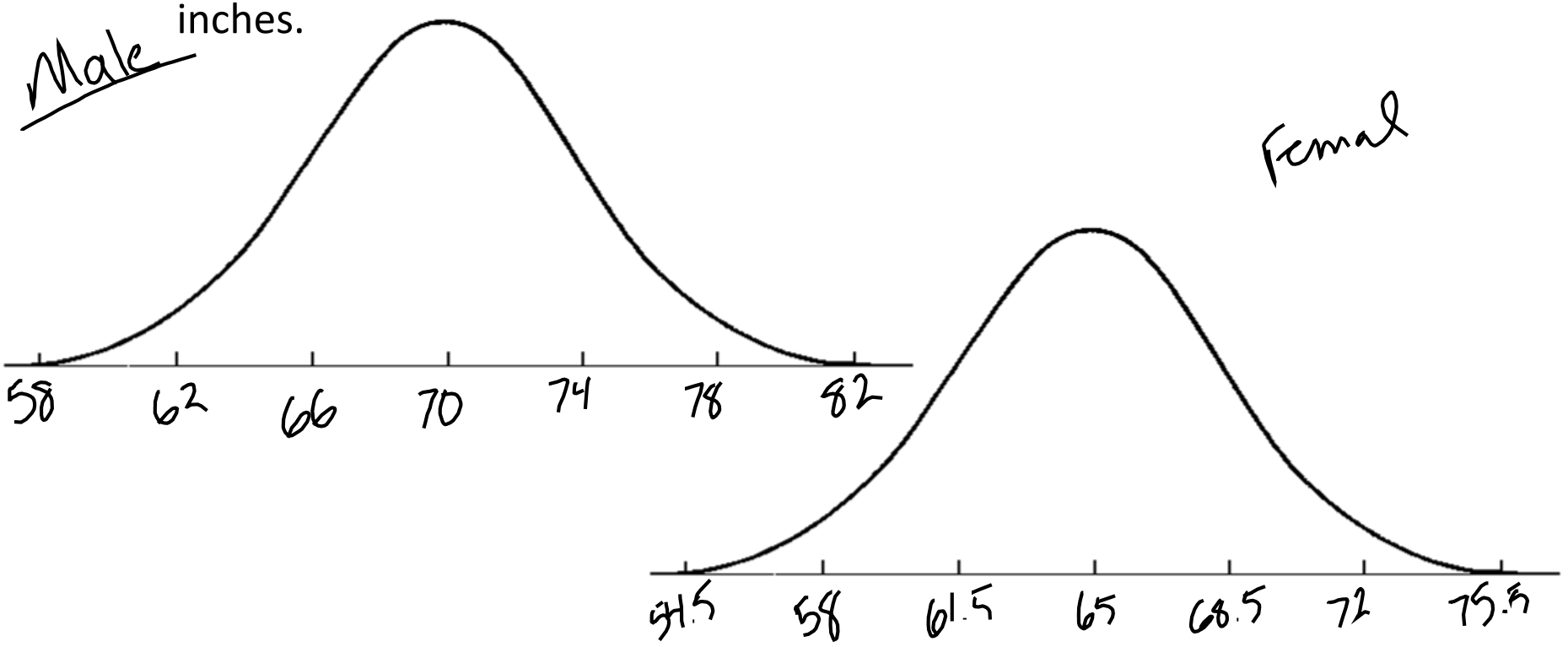

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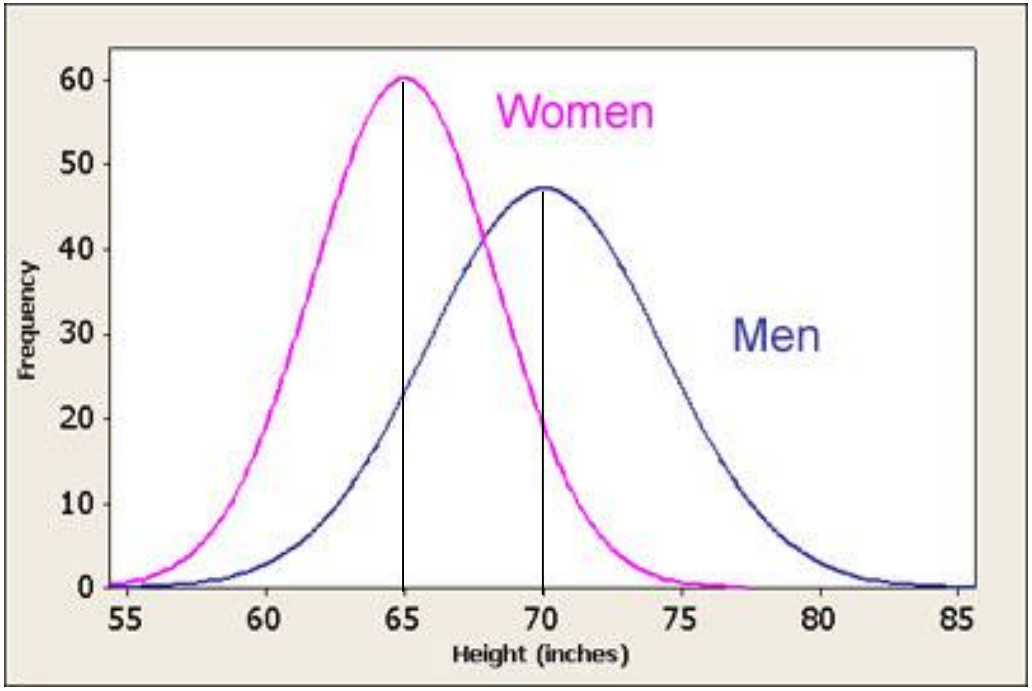
Am I tall or short?



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Standardized Score OR Z-score

Standardized test statistic: $\dfrac{\text{statistic} - \text{parameter}}{\text{standard deviation of statistic}}$ $\rightarrow Z = \dfrac{x - \mu}{\sigma}$

Ms. Blunt $z = \dfrac{(67 - 65)}{3.5}$

Height: 5'7" 67

Z-score: 0.571

Mr. Price $z = \dfrac{73 - 70}{4}$

Height: 6'1" 73

Z-score: 0.75

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height :

z-score :

%ile :

Percentile

71.57%ile

% of data points at or below the given data point

- Using the table

0.571

0.75

0.7734

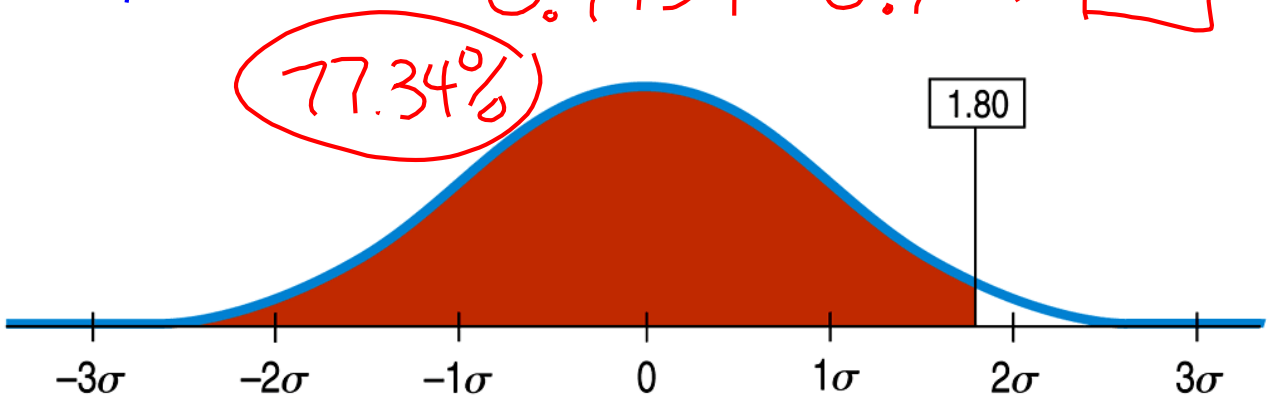
0.7157

.07

0.5

.5

0.7 →



z	.00	.01
1.7	.9554	.9564
1.8	.9641	.9649
1.9	.9713	.9719

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Percentile

- Using the TI-nspire

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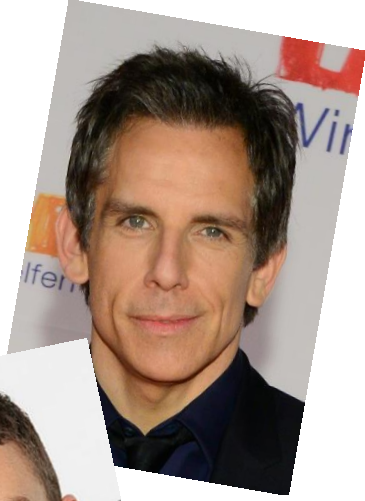
Given N(70, 4) inches

Find the z-scores for the following men

Ben Stiller: 66.5 inches



Justin Timberlake: 73 inches

Let's find their individual percentiles

Find the percentage of people between Ben Stiller and Justin Timberlake

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How tall are these actresses?

- Drew Barrymore – 42.07th percentile
  0.4207 ← -0.20
- Uma Thurman – 97.72 th percentile

$$Z = \frac{X - \mu}{\sigma}$$

$$3.5 \cdot -0.2 = \frac{X - 65}{3.5} \cdot 3.5$$

$$-0.7 = X - 65$$

$$+65 \quad +65$$

$$64.3 = X$$

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Practice

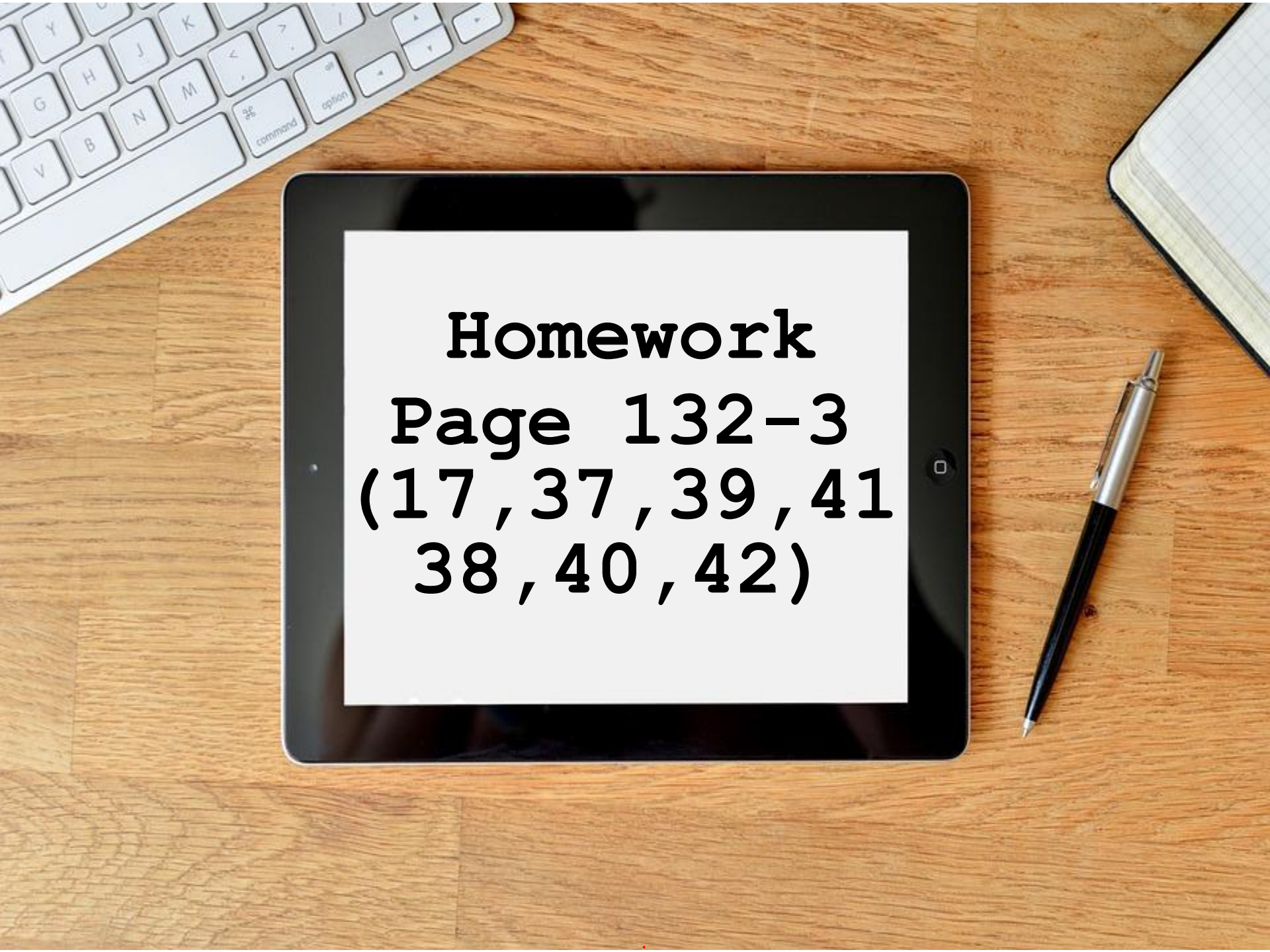
- A town's January high temperatures average 36° F with a standard deviation of 10°. What is the z-score this month of 55°?

- That same town has a mean in July of 74° and a standard deviation of 8°. What is the z-score this month of a temperature of 55°.

- In which month is 55° more uncommon? How do you know?

More Practice

An incoming freshman took her college's placement exams in French and mathematics. In French, she scored 82 and in math 86. The overall results on the French exam had a mean of 72 and a standard deviation of 8, while the mean math score was 68, with a standard deviation of 12. On which exam did she do better compared with other freshmen?


Homework
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