Name: Key

Problem Set 1.6: Standard Deviation

1. Standard deviation is a measure of spread

2. Which set of numbers has a higher standard deviation?

A) Set 1: 8, 12, 9, 11, 7, 13 Set 2: 2, 18, 1, 19, 3, 17

B) Set 1: 108, 112, 109, 111, 107, 113 Set 2: 2, 18, 1, 19, 3, 17

C) Set 1: 108, 112, 109, 111, 107, 113 Set 2: 8, 12, 9, 11, 7, 13

these two sets have the same st. dev.

3. **Estimate** the standard deviation of the following sets of numbers. Then put the data into fathom and calculate the actual standard deviation. How close were you?

estimate

actual SD using fathom

a. 88 92 79 86 94 91 94 86 90 93 mean = 89.3 st dev ≈ 3.6 S = 4.692

$\frac{1.3 + 2.7 + 10.3 + 3 + 3 + 4.7 + 1.7 + 4.7 + 3.3 + 0.7 + 3.7}{10} \approx 3.6$

b. 79 99 97 89 76 87 93 65 97 95 mean = 87.7 st. dev ≈ 8.76 S = 11.12

$\frac{8.7 + 11.3 + 9.3 + 1.3 + 11.7 + 0.7 + 5.3 + 22.7 + 9.3 + 7.3}{10} \approx 8.76$

c. 90 91 89 90 88 92 90 89 90 91 mean = 90 st. dev ≈ 0.8 S = 1.155

$\frac{0 + 1 + 1 + 0 + 2 + 2 + 0 + 1 + 0 + 1}{10} = \frac{8}{10} \approx 0.8$

d. 90 90 90 90 90 90 90 90 90 90 mean = 90 st. dev ≈ 0 S = 0

$\frac{0}{10} = 0$

e. 85 85 85 85 85 95 95 95 95 95 mean = 90 st. dev ≈ 5 S = 5.27

$\frac{5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5}{10} = \frac{50}{10} = 5$

4. According to WebMD, "Your blood pressure consists of two numbers: systolic and diastolic. Someone with a systolic pressure of 120 and a diastolic pressure of 80 has a blood pressure of 120/80, or "120 over 80." The systolic number shows how hard the blood pushes when the heart is pumping. The diastolic number shows how hard the blood pushes between heartbeats, when the heart is relaxed and filling with blood. High blood pressure (hypertension) is 140/90 or higher."

The World Health Organization collected blood pressure for samples of various countries and some the data is in the table below.

a. Of the countries listed, which has the biggest problem with hypertension?

Yugoslavia - they have the highest systolic and diastolic means

b. Compare the systolic values for China and Italy.

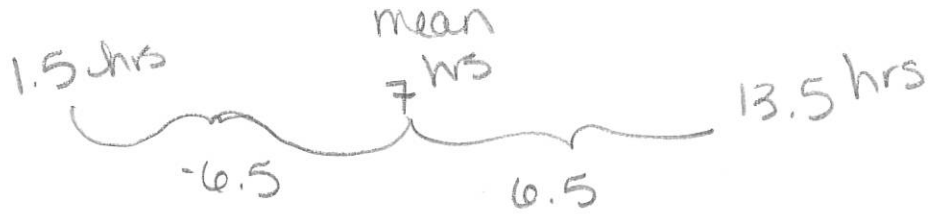
They have the same mean, but China has a higher standard deviation. So China has more variability

c. Compare the systolic values for Switzerland and Yugoslavia.

They have different means, but the same standard deviation. So Yugoslavia has a higher average BP than Switzerland, but they both have a similar variation relative to the mean.

	Systolic		Diastolic	
Country	**Mean**	**Std Dev**	**Mean**	**Std Dev**
China	129	24	80	13
Italy	129	19	82	10
Switzerland	128	19	77	11
Yugoslavia	135	19	86	11

Sources: WebMD, Hypertension, http://www.webmd.com/hypertension-high-blood-pressure/tc/high-blood-pressure-hypertension-overview, 12/23/12 World Health Organization, Blood Pressure by Country, http://www.ktl.fi/publications/monica/bp/table8.htm, 12/23/12



5. The Journal of the American Medical Association published an article in Sept. of 2011 titled "Lesbian, gay, bisexual, and transgender-related content in undergraduate medical education". The study sampled US medical students asking how many hours they spent on LGBT health. The mean was 7 hours with a standard deviation of 6.5 hours. **What does this suggest about the US medical health community and how they feel regarding the study of LGBT health?**
American Medical Student Association, On Call, http://www.amsa.org/AMSA/Homepage/TakeAction/AMSAOnCall/11-09-14/Are_Med_Students_Receiving_Adequate_Education_on_LBGT_Issues.aspx, 12/23/11

suggests that schools either value LBGT health education and focus a lot of time on it, or they spend very little time on it (high variation).

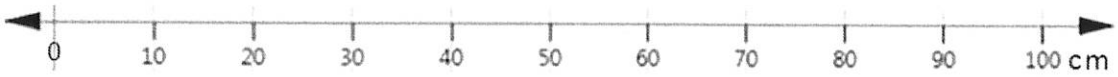
6. Create a data set with 10 numbers that you think would have a mean of 7 hours and a standard deviation of 6.5 hours.

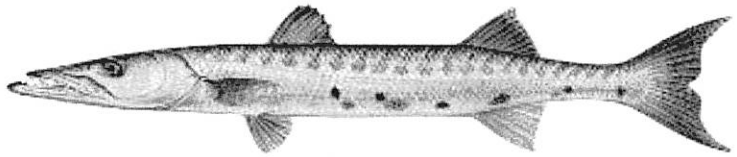
many acceptable answers

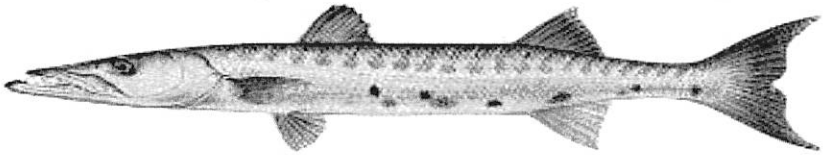
ex] 8 0 15 1 14 1 14 2 13 2

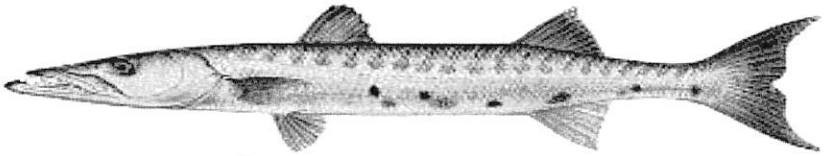
a. Now enter these numbers into Fathom and see if you were close. If not, change the numbers until the mean is 7 and the standard deviation is 6.5.

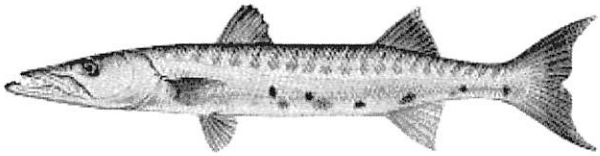
7. Below are images of Barracuda of various lengths. ***Estimate*** the mean and standard deviation length of the fish.
Image source: Florida Fishing Info, Naples Fishing,
http://www.floridafishinginfo.net/naples_florida_fishing.html, 11/20/11

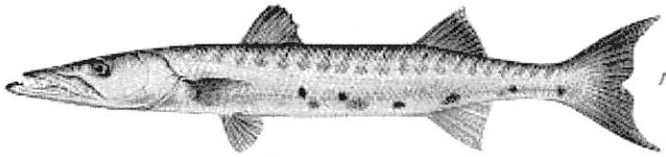


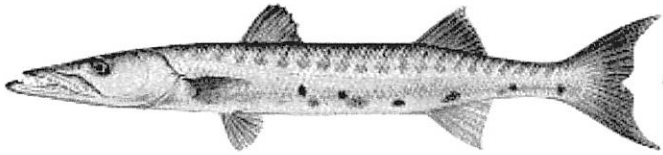

≈ 70

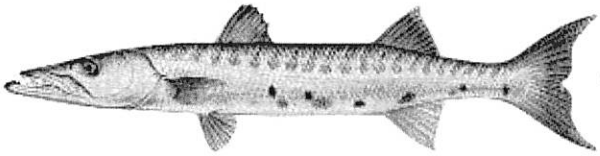

≈ 80

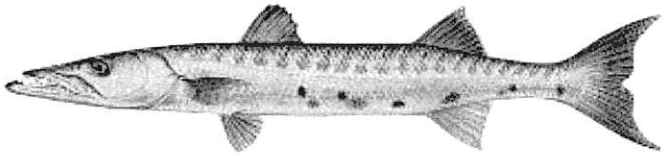

≈ 80

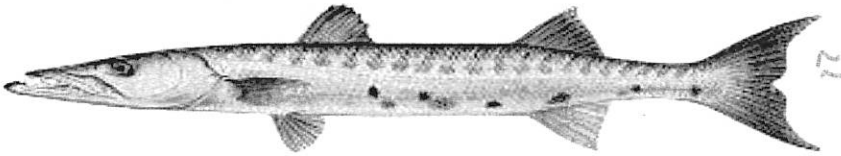

≈ 60


≈ 65


≈ 65


≈ 60


≈ 65


≈ 85

estimates

$\bar{x} \approx$ 70ish

$s \approx$ 10ish