Show all work for partial credit including calculator keystrokes when used.

1. According to the Florida Department of Environmental Protection, Florida may have the largest convergence of freshwater springs on the planet with over 700 springs. Below is a partial list of variables the EPA report. Determine whether each variable is a categorical (C) or a quantitative variable (Q).

(5)

a.) Magnitude of daily water flow (1st, 2nd, 3rd, 4th, etc)   C

b.) Name of spring   C

c.) County of location   C

d.) Temperature (degrees Fahrenheit)   Q

e.) Type (RR, GS, SS, SK, etc)   C

2. Springs are often classified by their daily discharge of water flow using nine different magnitudes. The following table describes the frequency of springs in Florida for the first four magnitudes.

Magnitude	Frequency	
1st	36	$\frac{36}{107}$ = 33.6%
2nd	56	52.3%
3rd	10	9.3%
4th	+ 5	4.7%
	107	

Categorical data can be graphed as a bar or pie chart

(2)

(6) Create an appropriate display for these data.

Florida Spring magnitude
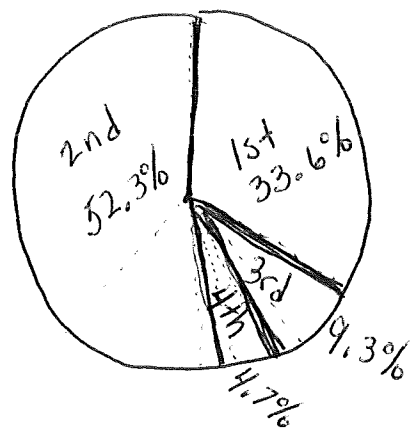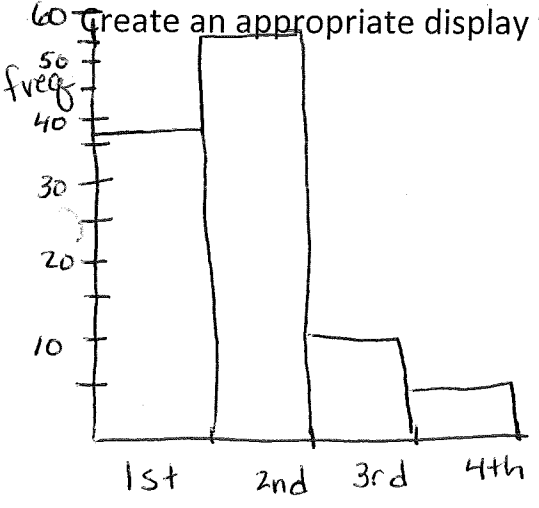

Florida Spring magnitude

3. The following is a list of average water temperatures at the source of 3rd magnitude springs in Florida measured in degrees Fahrenheit.

75.9	74.6	74.0	69.5	72.7
74.5	74.0	86.4	74.7	68.0

a.) Sketch an appropriate graph.

⑤

Quantitative Data can be graphed by Histogram or Box Plot

min   Q1   med   Q3
68 69.5 72.7 74.25 74.7   75.9 86

Avg Spring water Temperature

Avg Spring water Temper
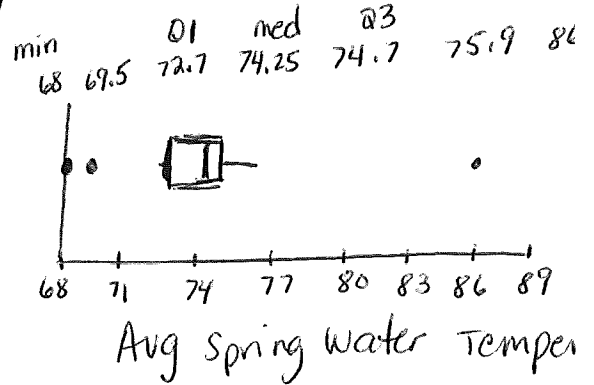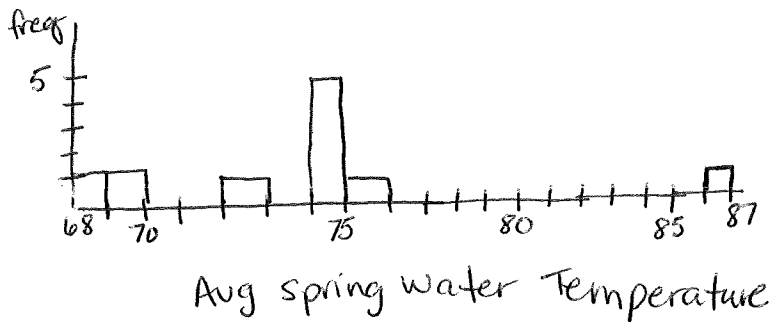
b.) Describe the distribution in terms of shape.

②

right skewed   symmetric

c.) Describe the distribution in terms of center.

②

median = 74.25   mean = 74.43

d.) Describe the distribution in terms of spread.

②

$IQR = Q3 - Q1$
$= 74.7 - 72.7$
$= 2$

$SD = 4.882633625$

e.) Calculate the lower and upper fences. Are there any outliers?   69.7

④

lower = left = $Q1 - 1.5(IQR) = 72.7 - 1.5(2)$ = ~~70.0~~

Yes 68 and 69.5 are both outliers on left

upper = right = $Q3 + 1.5(IQR) = 74.7 + 1.5(2) = 77.7$

Yes 86.4 is an outlier on the right.

4. For Florida springs with magnitude 1st through 4th, the average water temperature reported at the source is 72.2 degrees Fahrenheit with a standard deviation of 2.3 degrees Fahrenheit.

(5) a) What is the probability a Florida spring would have a temperature between 69 and 74 degrees Fahrenheit? Sketch the graph and include 3 standard deviations on either side of the mean. Shade the appropriate area. Show all work for credit. Write all 9 decimal digits. Do not round.
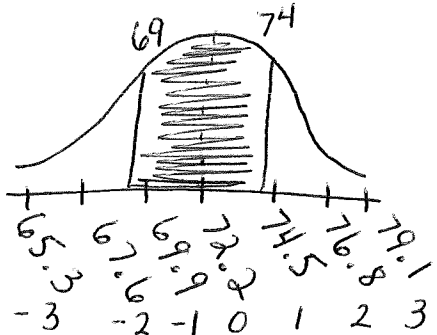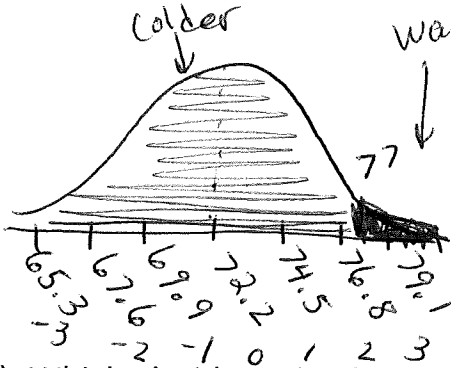
$$Z = \frac{data - center}{SD} = \frac{69 - 72.2}{2.3} = -1.391304348 \nearrow Ⓐ$$

$$Z = \frac{data - center}{SD} = \frac{74 - 72.2}{2.3} = 0.7826086957 \nearrow Ⓑ$$

$$normalcdf(Ⓐ, Ⓑ) = \boxed{0.7010649701}$$

69 74

65.3 67.6 69.9 72.2 74.5 76.8 79.1
-3 -2 -1 0 1 2 3

(5) b) What is the probability a Florida spring would have a temperature <u>warmer</u> than 77 degrees Fahrenheit? Make a fresh sketch shading the appropriate area. Show all work for credit. Write all 9 decimal digits. Do not round.

Colder   warmer

77

$$Z = \frac{data - center}{SD} = \frac{77 - 72.2}{2.3} = 2.08695652$$

$$\text{normalcdf} (-100, Ⓐ) = \boxed{0.981554032}$$

$$normalcdf(Ⓐ, 100) = \boxed{0.0184459679}$$

65.3 67.6 69.9 72.2 74.5 76.8 79.1
-3 -2 -1 0 1 2 3

(5) c) Which Florida spring is more unusual: Blue Hole Spring in Jackson County with a temperature of 64.2 degrees Fahrenheit or Lithia Spring in Hillsborough County with a temperature of 77.2 degrees Fahrenheit? Explain your reasoning.
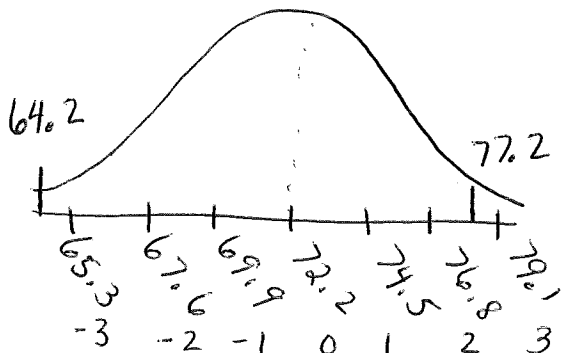
Blue Hole in Jackson County
$$Z = \frac{data - center}{SD} = \frac{64.2 - 72.2}{2.3} = -3.47826087$$

Lithia Spring in Hillsborough County
$$Z = \frac{data - center}{SD} = \frac{77.2 - 72.2}{2.3} =$$
$$2.173913043$$

64.2   77.2

65.3 67.6 69.9 72.2 74.5 76.8 79.1
-3 -2 -1 0 1 2 3

Blue Hole in Jackson County is more unusual since it has a z score farther from the mean.