Name ___KEY___

Instructions: Show all work. Use exact answers or appropriate rounding conventions. If you use your calculator, you can show work by saying which calculator commands you used.

1. A random sample of n=15 heat pumps of a certain type yielded the following observations on lifetime (in years).

2.0	1.3	6.0	5.1	0.4	1.0	5.3	1.9
15.7	0.7	0.9	4.8	12.2	5.3	0.6	

a. If we assume that the data is normally distributed, find the 99%, 95% and 90% confidence intervals using the t-distribution and appropriate degrees of freedom.

T Interval

90%   (2.0856, 6.221)

95%   (1.6355, 6.6712)

99%   (.65867, 7.648)

b. Calculate the 95% prediction interval for the next measurement.

$$\bar{x} \pm t_{\alpha/2, n-1} \, S \sqrt{1 + \frac{1}{n}}$$

$$100 - 95\% = 5\% = \frac{\alpha}{2} = 2.5\%$$

$$n - 1 = 15 - 1 = 14$$

$$\text{inv} \, T(.975, 14) = 2.144786681$$

$$\approx 2.145$$

1-Var Stats $\bar{x} = 4.153$

$S = 4.54668$

$$\bar{x} \pm 2.145 \cdot 4.54668 \sqrt{1 + \frac{1}{15}} = \bar{x} \pm 10.07$$

$4.153 - 10.07 = -5.917$ (time can't be neg here so I will use 0)

$4.153 + 10.07 = 14.223$ (0, 14.223) | this data suggests lifetimes are not very normal