(1) Consider a new drug that is being studied to alter red blood cell (RBC) counts in individuals. The mean number of RBC in normal individuals is 5 million cells per microliter (cells/mcL). A trial study was performed in which some volunteers took the drug and had their RBC numbers counted. The data is:

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5138000  4970000  5220000  5198000  4870000  5066000  4986000
5165000  5065000  5205000  5157000  4946000  5165000
5015000  5106000  5192000  4964000  4999000  4892000
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(a, 2 pts) Which “population” are we really studying with our sample?

(b, 1 pt) What is $H_0$:

(c, 1 pt) What is $H_A$:

(d, 2 pts) What is the sample mean? 
(provide value to nearest 0.1) 
$\bar{X} =$ __________

(e, 2 pts) What is the sample standard error? 
(provide value to nearest 0.1) 
$SE =$ __________

(f, 2 pts) What is $t_{calc}$? 
(provide value to nearest 0.001) 
$t_{calc} =$ __________

(g, 2 pts) What is $t_{crit}$ for significance at the p<0.05 level? 
(provide value to nearest 0.001) 
$t_{crit} =$ __________

(h, 2 pts) Is the mean RBC value of the volunteers different than expected and, if so, how? 
Use the grammar described in lecture and state with what degree of confidence you make your conclusion by providing the most specific range of p values from the table provided in lecture. 
You must use the phrase "significantly smaller", "significantly larger" or "not significantly different" in your answer.
(2, 3 pts) Consider a population of frogs living on an island. We believe that the frogs may be members of a species call *Rana Pipiens*. The mean length of *Rana Pipiens* is known to be 11cm. The following length values (cm) were obtained for a sample of individuals from the island:

11.2  10.7  9.9  10.3  10.1  9.8  10.5  11.7  10.1  12.0  
12.0  9.7  9.5  11.0  9.7  11.5  11.1  12.5  10.5  9.8

Do these frogs have sizes that are consistent with their being *Rana Pipiens* or not? Base your decision on whether the mean length of the island frogs is as expected. Use the grammar described in lecture and state with what degree of confidence you make your conclusion by providing the most specific range of p values from the table provided in lecture. You must use the phrase "significantly smaller", "significantly larger" or "not significantly different" in your answer.

(3, 3 pts) A researcher is investigating the possibility that a newly isolated alkyloid may work as a protease and speed up the degradation of proteins. She measures the mean time it takes for a standard sized protein plaque to dissolve in a solution of 1% alkyloid and 99% water (min). Previous studies have confirmed that the mean time to dissolve in 100% water is 28 minutes, her times are:

26.3  27.7  28.1  29.0  27.1  28.3  26.3  27.9  
28.1  25.3  27.4  29.0  27.7  26.5  26.4  26.6

Does this alkyloid seem to act as a protease? Base your decision on whether the dissolving time is less than expected and perform the correct test to answer this specific questions. Use the grammar described in lecture and state with what degree of confidence you make your conclusion by providing the most specific range of p values from the table provided in lecture. You must use the phrase "significantly smaller", "significantly larger" or "not significantly different" in your answer.