AP Statistics AP Exam Review Homework #1

Question 1 is a regular AP question---12 minutes to complete while #2 is a #6 –type question ---25 minutes to complete)
1. A Study was conducted to determine where moose are found in a region containing a large burned area. A map of the study area was partitioned into the following four habitat types.
  (1) Inside the burned area, not near the edge of the burned area,
  (2) Inside the burned area, near the edge,
  (3) Outside the burned area, near the edge, and
  (4) Outside the burned area, not near the edge.

The figure shows the four habitats.

The proportion of total acreage in each of the habitat types was determined for the study area. Using an aerial survey, moose locations were observed and classified into one of the four habitat types. The results are given in the table below.

Habitat Type	Proportion of Total Acreage	Number of Moose Observed
1	0.340	25
2	0.101	22
3	0.104	30
4	0.455	40
Total	1.000	117

(a) The researchers who are conducting the study expect the number of moose observed in a habitat type to be proportional to the amount of acreage of that type of habitat. Are the data consistent with this expectation? Conduct an appropriate statistical test to support your conclusion.

(b) Relative to the proportion of total acreage, which habitat types did the moose seem to prefer? Explain.

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2. A pharmaceutical company has developed a new drug to reduce cholesterol. A regulatory agency will recommend the new drug for use if there is convincing evidence that the mean reduction in cholesterol level after one month of use is more than 20 milligrams/deciliter (mg/dl), because a mean reduction of this magnitude would be greater than the mean reduction for the current most widely used drug.

The pharmaceutical company collected data by giving the new drug to a random sample of 50 people from the population of people with high cholesterol. The reduction in cholesterol level after one month of use was recorded for each individual in the sample, resulting in a sample mean reduction and standard deviation of 24 mg/dl and 15 mg/dl, respectively.

(a) The regulatory agency decides to use an interval estimate for the population mean reduction in cholesterol level for the new drug. Provide this 95 percent confidence interval. Be sure to interpret this interval.

(b) Because the 95 percent confidence interval includes 20, the regulatory agency is not convinced that the new drug is better than the current best-seller. The pharmaceutical company tested the following hypotheses.
$$H_o : \mu = 20 \text{ versus } H_a : \mu > 20$$
where μ represents the population mean reduction in cholesterol level for the new drug.

The test procedure resulted in a t-value of 1.89 and the p-value of 0.033. Because the p-value was less than 0.05, the company believes that there is convincing evidence that the mean reduction in cholesterol level for the new drug is more than 20. Explain why the confidence level and the hypothesis test led to different conclusions.

(c) The company would like to determine a value L that would allow them to make the following statement.
     We are 95 percent confident that the true mean reduction in cholesterol level is greater than L.
A statement of this form is called a one-sided confidence interval. The value L can be found using the following formula:
$L = \bar{x} \pm t^* \dfrac{s}{\sqrt{n}}$. This has the same form as the lower endpoint of the confidence interval in part (a), but requires a

different critical value, t^*. What value should be used for t^* ?
Recall that the sample mean reduction in cholesterol level and standard deviation are 24 mg/dl and 15 mg/dl, respectively. Compute the value of L.
(d) If the regulatory agency had used the one-sided confidence interval in part (c) rather than the interval constructed in part (a), would it have reached a different conclusion? Explain.