BIO 300 - ASSIGNMENT #9

NOTE: This assignment is due Friday, November 19th.

1. A study of patients with insulin-dependent diabetes was carried out to investigate the effects of smoking on a variety of medical complications. The baseline set of data included measures of systolic blood pressure in a random sample of patients from four subgroups: nonsmokers, current smokers, ex-smokers, and tobacco chewers. Means and standard deviations below are in mm of mercury. The number of patients is denoted by n.

Group	n	$\overline{X}$	s
Nonsmokers	259	113	13.4
Current smokers	53	119	10.1
Ex-smokers	28	118	11.6
Tobacco chewers	9	126	12.2

  (a) Test whether mean blood pressure differs among the four populations of patients.
  (b) What assumptions are you making in (a)?
  (c) Is this a random effects or fixed effects model?
  (d) On the basis of your result in (a), can you conclude that smoking increases blood pressure?

2. The following data resulted from an experiment in which seeds of three different species were planted, and the number that germinated within five weeks was recorded. Test whether seed types differed in the tendency to germinate.

seed species	germinated	failed to germinate
1	57	33
2	87	60
3	69	24

3. Answer briefly:
  a) When carrying out a series of m related tests, what method is recommended to ensure that the probability of at least one type I error is no greater than 0.05?
  b) When testing for differences among means of k treatments, why is ANOVA preferred over an alternate approach in which $k(k-1)/2$ two sample t-tests are carried out between all pairs of treatments?