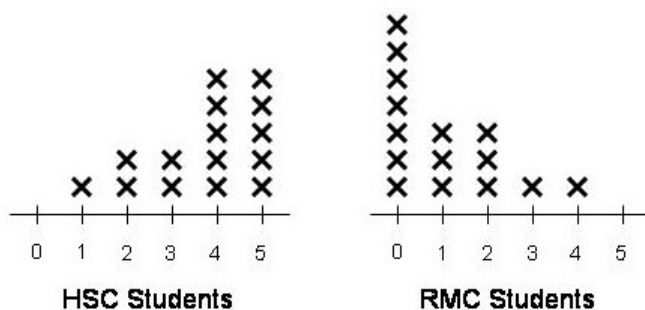


1. (10 pts) Consider the following hypotheses.

H_0 : My quail-hunting buddy is in my line of fire.

H_1 : My quail-hunting buddy is not in my line of fire.

- (a) (4 pts) Describe what a Type I error would be in this situation.
- (b) (4 pts) Describe what a Type II error would be in this situation.
- (c) (2 pts) Which type of error would be more serious? Explain.
2. (18 pts) A researcher has a group of 15 Hampden-Sydney students and a group of 15 Randolph-Macon students. He poses 5 statistics questions to each of the 30 subjects and he observes the number of correct answers. The following diagrams show the distributions of the number of correct answers for each of the two groups.



Then you are presented with one of the two groups (you cannot tell which). You choose one student at random from that group and pose to him the same 5 statistics questions and observe the number of correct answers. Here are the hypotheses:

H_0 : The student was selected from the HSC students.

H_1 : The student was selected from RMC students.

You decide that if there at least 4 correct answers, then you will conclude that it was an HSC student. Otherwise, you will conclude that it was an RMC student.

- (a) (4 pts) What is the direction of extreme?
- (b) (4 pts) What is the value of α ?
- (c) (4 pts) What is the value of β ?
- (d) (3 pts) If the selected student gives 4 correct answers, what is the p -value?
- (e) (3 pts) If the selected student gives 1 correct answer, what is the p -value?

3. (25 pts) The following excerpts are from an article on the website of the Palestine Media Center (<http://www.palestine-pmc.com/details.asp?cat=3&id=966>).

Gallup Palestinian Survey Reveals Broad Discontentment With Status Quo

28/01/2006
<http://poll.gallup.com>
GALLUP NEWS SERVICE
January 27, 2006

By Lydia Saad

PRINCETON, NJ – The seeds for Hamas' landslide victory in Wednesday's Palestinian elections can be seen in polling Gallup conducted in the Palestinian territories just a few weeks earlier. Though everyone from Palestinian leaders to President Bush to the Israeli Knesset has been surprised by the election results, Gallup found widespread Palestinian discontentment with official corruption, the lack of job creation, and general incompetence that can easily explain the ouster of Fatah.

The Gallup Organization sponsored a nationally representative survey of 1,000 Palestinians aged 15 and older living in the West Bank, the Gaza Strip, and East Jerusalem as part of its Gallup World Poll. In-person interviews were conducted from Dec. 26, 2005, through Jan. 8, 2006.

Palestinians were asked more than 200 questions concerning their personal lifestyles and well-being, their religious commitment and values, their assessments of political leaders and foreign countries, and their views on achieving self-determination and peace with Israel.

- The majority of Palestinians think the cease-fire with Israel should be extended in 2006 if both sides agree to it (51%). Only 34% would not extend it.
- Nearly two-thirds of Palestinians say they support the peace process with the Israelis: 26% strongly support it and 39% moderately support it; only 30% oppose it. Current views on this are similar to where they stood six years ago.
- Half of Palestinians (51%) rate current conditions in Palestine in the worst possible terms (0 to 3 on a scale of 0 to 10). Only 8% rate them in highly positive terms (7 to 10).

- (a) (4 pts) Describe the *sample*?
- (b) (4 pts) Describe the *population*?
- (c) (2 pts) What is the sample size?
- (d) (4 pts) Was this study an *observational* study or an *experiment*? Explain.
- (e) (4 pts) In the first bulleted item, is the 51% figure a *parameter* or a *statistic*? Explain.

- (f) (4 pts) In the second bulleted item, suppose the hypotheses were
 H_0 : Opinion on this question has not changed as compared to six years ago.
 H_1 : Opinion on this question has changed as compared to six years ago.
Are the results of the current survey *statistically significant*? Explain.
- (g) (3 pts) In the third bulleted item, did the researchers use a *qualitative* or a *quantitative* variable? Explain.
4. (14 pts) During the past academic year, Hampdey-Sydney College had over 1350 applicants. For the sake of this problem, assume that there were exactly 1350 applicants. Suppose that the Admissions Office has a file cabinet with one folder for each of the 1350 applicants and that the folders are numbered 1 through 1350. You would like to take a random sample of 50 applicants from which to obtain a profile of the applicant pool.
- (a) (5 pts) Suppose you use a simple random sample. Use a seed of 73 and the TI-83 to choose the first 5 folder numbers for your sample.
- (b) (4 pts) Suppose you use systematic 1-in- k sampling. What should k be if your goal is to have 50 applicants in your sample?
- (c) (5 pts) Use a seed of 48 and the TI-83 and your value of k from part (b) to choose the first 5 applicants in your sample.
5. (9 pts) Suppose two researcher conducted similar opinion polls to gauge feelings on current events.
- (a) (3 pts) One researcher asked the subjects their opinion about the “unprecedented warrantless domestic spying on American citizens” and the other researcher asked about the “monitoring of overseas phone calls to suspected al Qaeda terrorists during wartime.” The survey results would likely differ. What kind of bias would this be?
- (b) (6 pts) If the first researcher mailed his survey as a questionnaire to the membership of the ACLU and received responses from 20% of them, what *two* types of bias would be present in his sample?
6. (5 pts) In a medical experiment designed to test the effectiveness of a new drug, describe how the researcher might control for experimenter, or observational, bias.

7. (19 pts) The tenures of 28 female HSC faculty are given in the following list.

2 3 4 4 6 6 7 8 8 8
 8 9 9 9 10 10 11 11 13 13
 13 15 17 18 21 23 30 32

- (a) (3 pts) Explain why a pie chart would not be a good choice of display for these data.
- (b) (3 pts) Explain why the following stem-and-leaf plot does not give a good display of these data.

```

0 | 2 3 4 4 6 6 7 8 8 8 8 9 9 9
1 | 0 0 1 1 3 3 3 5 7 8
2 | 1 3
3 | 0 2
  
```

- (c) (6 pts) Draw a stem-and-leaf plot *with split stems* of these data.
- (d) (4 pts) Based on your display in part (c), use correct statistical terminology to describe the shape of the distribution.
- (e) (3 pts) A histogram of the data is shown below. Is the shape of the histogram consistent with the shape of your stem-and-leaf plot? That is, would it lead you to give the same verbal description of the shape of the distribution that you gave in part (d)?

