This “knowledge festival” covers fundamental tool skills in statistics. A grade of 80% or higher on two different administrations of the test is needed, in order to pass the class. (The test may be taken multiple times.) The test is open book, open notes. A calculator may (and should) be used. Make sure you show your work.

Questions on this test are worth a total of 98 points; relative problem weights are given in brackets. You also get two points for spelling your name (correctly! and legibly!) in the space below.

Enjoy!!

“On my honor, I affirm that I have neither given nor received unauthorized assistance on this test.”

__________________________________________________
(signature)

__________________________________________________
(name, printed legibly)

CLASS SECTION (check one):

_______ Monday at noon
_______ Monday at 2:30
_______ Wednesday at noon
_______ Wednesday at 2:30

QUESTION 1 [8 points]:
Use a calculator built-in function or a spreadsheet to find the sample standard deviation of the following data:

17.29  31.44  29.86  23.42  19.71  27.42

The sample standard deviation is: _______________

QUESTION 2 [10 points]:
For a normal distribution, approximately _____________ of the data lie within one standard deviation of the mean and approximately _____________ of the data lie within two standard deviations of the mean.
QUESTION 3 [2 points]:
Indicate whether the following statement is TRUE or FALSE.

If the data are skewed right, then the mean will be less than the median. TRUE FALSE

QUESTION 4 [14 points]:
Medical scientists at Todenkopf Pharmaceuticals are working hard to develop a cure for Snerdwell Syndrome, a rare but debilitating condition that causes severely reduced ability to enjoy statistics problems. Preliminary research indicates that the disease may be linked to levels of the polycyclic hydrocarbon dimethylbenzantracene (DMBA) in a person’s bloodstream. Given below are DMBA levels (in parts per million, or ppm) found in blood samples of thirty healthy volunteers. Sketch a histogram of these data. (Make sure you label the axes appropriately.) State in a sentence or two what your graph tells you about the distribution of DMBA in healthy individuals. Based upon these data, what are “typical” and “abnormal” levels of DMBA?

21.34 23.81 25.13 27.04 30.22
22.17 24.19 25.37 27.41 32.16
22.95 24.27 25.81 28.09 34.31
23.37 24.51 26.09 28.32 35.82
23.58 24.68 26.37 29.15 37.48
23.72 24.82 26.51 29.88 39.12
QUESTION 5 [24 points; 8 each part]:

Wildlife biologists have determined that tail length of dwarf pygmy wombats on the island of Kafoonistan are normally distributed with a mean of 42 centimeters and a standard deviation of 5 centimeters.

a) What percentage of dwarf pygmy wombats have tails that are 45 centimeters long, or shorter?

b) What percentage of dwarf pygmy wombats have tails that are 82 centimeters long, or longer?

c) What tail length would put a wombat in the top 13% of the distribution?
QUESTION 6 [20 points, divided as indicated]:
Dr. Rasp randomly selects a sample of five STAT 201 students. He obtains data on how often each has fallen asleep in class, so far this semester. The data are below.

| 3 | 9 | 1 | 4 | 8 |

[Remember to show your work on these. Even if your electronic fingers-and-toes will do all the computations, you should still demonstrate that you know what is happening inside the black box.]

a) [4] Give the sample mean for the data.

b) [4] Find the sample median for the data.

c) [8] Find the sample variance for the data.

d) [4] Find the sample standard deviation for the data.
QUESTION 7 [20 points, divided as indicated]:

“Craps” is a gambling game played with two dice. There are many wagers possible in craps. The most common of these is called the “pass” bet.

In the “pass” bet, the gambler rolls two dice. If the total is 7 or 11, then s/he wins immediately. If the total is 2, 3, or 12, then s/he loses immediately. On any other outcome (4, 5, 6, 8, 9, or 10), the result is called the player’s “point.” The bettor then continues to roll until s/he gets a 7 (in which case the bet is lost) or the original point (in which case the bet is won).

The “pass” bet pays even money – that is, if you bet $1 and win, you get your dollar back plus one dollar in winnings. If you lose, you of course lose your dollar.

Working out the probability of winning is a somewhat difficult exercise. (We’ll cover it at the end of the semester.) We’re not going to worry about it for now. It can be shown that the probability of winning the “pass” bet is 0.493 – that is, just under a 50/50 chance. We want to find the expected value and expected variance of the net winnings at the “pass” bet.

a) [4] Set up a table giving the outcomes, and probabilities, for the net winnings from one play of the “pass” bet.

b) [8] Based upon your table in Part A, find the expected value of the net winnings.

c) [8] Based upon your work above, find the expected variance of the net winnings.