1. Suppose that for a given entering class at UCLA this is the race & gender distribution:

	ANGLO	ASIAN	LATINO	AFRICAN AMERICAN.	OTHER
MALE	0.20	0.17	0.07	0.04	0.02
FEMALE	0.18	0.13	0.09	0.08	0.02

Assume these racial/ethnic classifications are mutually exclusive. If you can treat these proportions as probabilities, what is the probability that a student will be either Asian or Latino?

(a)   .023
(b)   .048
(c)   .230
(d)   .344
(e)   .460

total Asian = .30
total Latino = .16
   total = .46

2.   An astronaut's oxygen supply comes from two independent sources. Source A has a 90% chance of working and Source B has a 80% chance of working. What is the chance that at least one of the sources will be working?

A.   72%
B.   80%
C.   90%
D.   98%
E.   There is not enough information to calculate the chance.

$(.90 \times .80) + (.90 \times .20) + (.10 \times .80) = .98$
   .72   .18   .08
or $1 - (.10 \times .20) = .98$

3. A Die is rolled 4 times. What is the chance that none of the rolls show 4 or more spots?

A.   less than 1%
B.   1.20%
C.   6.25%
D.   50%
E.   93.75%

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = .0625$

prob 3 or less = $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$

4.   A fair coin will be tossed some number of times and the object is to guess the total number of heads. There is a $1 penalty for each head that the guess is off. For example, if a coin is tossed 10 times and you guess 5 heads and 4 heads show up, you lose $1. If you guess 5 heads and 6 heads show up, you lose $1.

You have no choice but to play. But you can choose the number of tosses:
(i)   50 tosses
(ii)   100 tosses

Which one should you choose to minimize your losses (i.e. which one is better)?
(circle one)
(i)
(ii)

Briefly justify your response:

Since we are working with a sum the SE is $\sqrt{\# draws} \cdot SD_{Box}$ and as the draws go up the larger we expect the discrepancy to be.

5.   A pumpkin farmer produces pumpkins that average 12lbs in weight, with a standard deviation of two pounds. The pumpkins are packed 16 to a crate. What is the chance that a single crate weighs more than 195 pounds?

(a)   Less than 1%
(b)   About 7%
(c)   About 13%
(d)   About 34%
(e)   About 69%

$16 \times 12 = 192$ lbs (expect)

$$\frac{195 - 192}{\sqrt{16 \cdot 2}} = \frac{3}{8} = {}^{+}.375$$

$\approx {}^{+}.40$
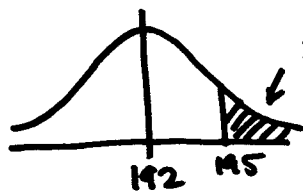
look up Z score

The remaining 5 problems are related to each other and use the information below:

There are 20,000 restaurants in the County of Los Angeles, 50% of them received a letter grade of "A" during inspections, 40% received either a B or a C grade and 10% failed their inspections. Restaurant grades are not normally distributed.

My financial adviser, the Oracle, has hired you as a temporary personal assistant. Your job is to schedule his next 16 dinners (Oracle never eats at home). Unfortunately, you didn't know about the rating system and you never eat out because you don't have the money. So you listened to your best friend and picked 16 restaurants at random from an internet database of the 20,000 restaurants in Los Angeles. The Oracle will give you +3 points if you choose "A" restaurants, +1.25 points if you choose "B" or "C" restaurants, and -20 points if you choose a restaurant with a failing grade. Treat your restaurant selections as if they were a random sample of restaurants.

6.   Construct a box model for this problem

suggested

| +3 | 1.25 | -20 |
| .5 | .4 | .1 |

7.   What is the expected value for the total score of the 16 restaurants selected at random?

Box Average $= (3 \times .5) + (1.25 \times .4) + (.1 \bar{\times} 20) = 0$

or $\dfrac{(3 \times 5) + (1.25 \times 4) + (1 \times -20)}{10} = 0$

Expected Value $= 16 \times 0 = 0$

8.   What is the standard deviation for the total score for a sample of 16 restaurants?

$$SD_{BOX} = \sqrt{\frac{(3-0)^2 + (3-0)^2 + (3-0)^2 + (3-0)^2 + (3-0)^2 + (1.25-0)^2 + (1.25-0)^2 + (1.25-0)^2 + (1.25-0)^2 + (-20-0)^2}{10}}$$
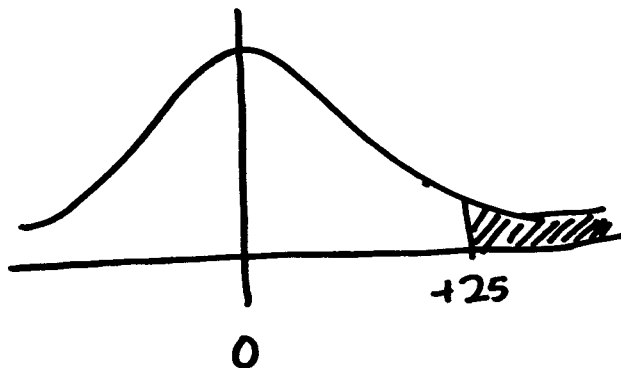
$= 6.7175$

9.   What is the standard error for the total score of a sample of 16 restaurants?
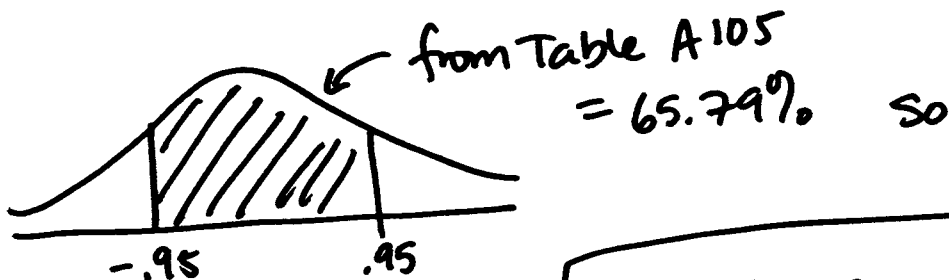
$$\sqrt{16} \cdot SD_{BOX}$$

$$4 \times 6.7175 = \boxed{26.87}$$

10. To convert your temporary job into a permanent job, you must have accumulated a total of at least +25 points from the Oracle after picking 16 restaurants for him. What's your chance of getting a total of at least +25 points after picking 16 restaurants? If it is not possible to calculate the chance, please write "not possible" below and explain why.

+25

0

$$\frac{25 - 0}{26.87} = .93 \sim .95$$

from Table A 105
$$= 65.79\% \text{ so}$$

-.95   .95

$$\frac{100 - 65.79}{2} = 17.1\%$$