REVIEW FOR STAT 2 MIDTERM

1. Find the area under the normal curve:
    a. To the right of 1.25

(100-78.87)/2=10.565

    b. To the left of -0.40

(100-31.08)/2=34.46

    c. To the left of 0.80

(100-57.63)/2=21.185

    d. Between 0.40 and 1.30

for z=1.30, area=80.64
for z=0.40, area=31.08
(80.64-31.08)/2=24.78

    e. Between -0.30 and 0.90

for z=-0.30, area=23.58
for z=0.90, area=63.19
(63.19-23.58)/2=19.805
63.19-19.805=43.385

    f. Outside of -1.5 and 1.5

(100-86.64)=13.36

2. You have a standard 6-sided die. Compute the following and explain your answers.

    a. If you roll the die once, what is your chance of getting a "6"?

        1/6 = 16.67%

    b. If you roll the die once, what is your chance of getting a "1" or a "2"?

        1/6 + 1/6 = 2/6 = 33.33%

[Addition Rule. §14.2]

    c. If you roll the die six times what are your chances of getting at least one "6"?

        P(6) = 1 – P(No 6)

        P(No 6) =

        == 0.3348

        P(6) = 1 - 0.3348 = 0.6651

        P(6) = 66.51%

[Opposite Chance. § 14.4]

    d. You roll the die 4 times, what are the chances that you get a "5" on both the first and the fourth roll.

        (1/6) x 1 x 1 x (1/6) = 1/36 = 27.78%

Note: Rolls two and three can have any outcome and not affect the question at hand. Therefore for those any of the 6 numbers out of the 6 possible outcomes are acceptable.

[Multiplication Rule, §13.3]

3. If the average is 535 and the SD is 100, estimate the 95th percentile.
For area of 90%, z=1.65. Translated back, this score is above average by 1.65x100=165. The 95th percentile is 535+165=700

4. You have a standard 52-card deck. Compute the following probabilities and explain your answers.

a) The first card you draw from the deck is an ace.

4/52 = 7.69%

b) You draw two cards without replacement, the first one is a heart and the second is a heart.

(13/52) x (12/51) = 5.88%

c) You draw two cards with replacement. That is you draw a card, put it back in the deck then draw another card. What are the chances the 2 cards are the exact same card (eg. Queen of hearts, or jack of spades)?

(52/52) x (1/52) = 1/52 = 1.92%

-This is an example of one you have to think about in some other way besides simple addition or multiplication rule. One way to think about it is you have already drawn the first card, what are the odds the second card matches the first? For the first card you can pick anything (52/52) and the second card must match the first (1/52)

5. A group of researchers is trying to find out whether the age of a car affects its braking capability. They test the minimum stopping distance of a group of 6 cars of different ages. The results are below:

Car age (months)	Minimum Stopping distance at 25 mph (feet)
9	93
15	96
24	123
30	119
38	120
46	116

a. Find the correlation coefficient for the data in the table above.
b.

	x	(x-ave)^2	standard units x		y	(y-ave)^2	standard units y		prod x*y
	9	324	-1.41732		93	330.1489	-1.51543		2.147853
	15	144	-0.94488		96	230.1289	-1.26522		1.195484
	24	9	-0.23622		123	139.9489	0.986656		-0.23307
	30	9	0.23622		119	61.3089	0.653044		0.154262
	38	121	0.866142		120	77.9689	0.736447		0.637868
	46	361	1.496063		116	23.3289	0.402836		0.602668
Ave=	27			Ave=	111.1667				
SD=	Sqrt(968/6) =12.70			SD=	Sqrt(862.8/6) = 11.99			r =	0.750844

c. How does r change if we measure the stopping distance in meters rather than feet? (1 foot is about 0.3 meters)

r stays the same.

d. A different group of researchers found the average age of cars in each of the 50 states and the average stopping distance in each state. They also find a positive correlation. In this study, it fair to say that the age of a car is the cause of greater stopping distance?

Nope, in this case we have an ecological correlation. We can't tell if the cars that are older are the same cars that have further stopping distances.

6. You flip a coin. If it lands on heads you draw a card from a standard deck, if it lands on tails you roll a die. Calculate the probability of the following and explain. [note: unless otherwise stated assume you are calculating the probability of the events occurring before the coin is even flipped]

a) You get heads and you roll a 5 on the die.

0%. The two events are mutually exclusive. That is the coin landing on heads prevents you from rolling the die at all.

b) You draw an ace from the deck.

(1/2) x (4/52) = 1/26 = 3.85%

c) You either roll a 2, or draw a 2 from the deck.

(1/2)x(1/6) + (1/2)x(4/52) = 12.17%

7. The average height of a large number of men is 68 inches and the SD is 2.7 inches. The average forearm length of these men is 18 inches and the SD is 1 inch. The scatter diagram is football-shaped. And the correlation between the two variables is 0.80.
   a. A man is 66 inches tall. The regression estimate of the man's forearm length is inches.

x in standard unit is (66-68)/2.7= -0.74*. Multiply it by r equals -0.6. So the regression estimate y = 18 + 1* $*$ (-0.6) *= 17.4 inches.*

   b. The r.m.s. error of the estimation in the previous problem is inches.

$\sqrt{1-r^2} * 1 = 0.6$ *inches.*

   c. Of the men who are 66 inches tall, about what percent have forearm length more than 18 inches? .

z-value is (18-17.4)/.6 = 1. So about 16%

   d. The SD of the forearm lengths of the men who are 67 inches tall
      i. is quite a bit greater than
      ii. is quite a bit less than
      iii. is about the same as - *ANSWER*
      iv. cannot be placed relative to the SD of the forearm lengths of the men who are 70 inches tall.
   e. The forearm lengths of about % of the men are within 1.5 inches of the average.

z-value is 1.5/1= 1.5, so about 86.64%

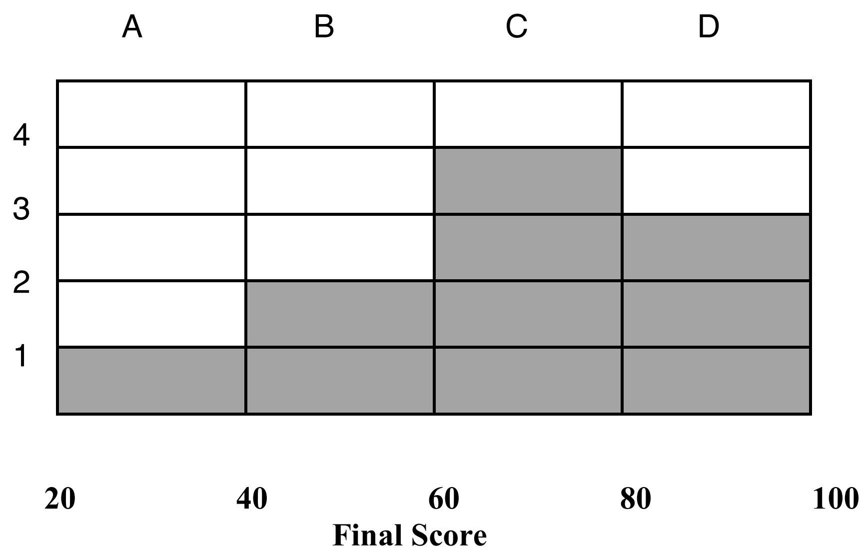
   f. For about 70% of the men, the forearm lengths are within inches of the regression estimate.

z-value is 1.05, so within 1.05 $*$ *0.6 = 0.63 inches.*

   g. For about % of the men, the regression estimate of forearm length based on height is off by more than 0.4 inches.

z-value is .4/.6= 0.67, so about 52%

8. The histogram below shows the distribution of final scores in a certain class.
   a. Which block represents the people who scored between 60 and 80? C
   b. Ten percent scored between 20 and 40. About what percentage scored between 40 and 60? 20%
   c. About what percentage scored over 60? 70%


A
B
C
D
4
3
2
1
20
40
60
80
100
Final Score