

Part I. Do all the Following (14 Points) **Make Diagrams! Show your work!**

$$x \sim N(3, 4)$$

1. $P(-2.30 \leq x \leq 1.85)$

2. $P(1 \leq x \leq 17)$

3. $P(x \geq 1.85)$

4. $F(4.00)$ (Cumulative Probability)

5. $P(-4.00 \leq x \leq 4.00)$

6. $x_{.015}$ (Find $z_{.015}$ first)

7. A symmetrical region around the mean with a probability of 25%

Exam is normed on 75 points. There are actually 128 possible points.

II. (10 points+-2 point penalty for not trying part a.) **Show your work!**

The following numbers apply to 9 developed countries and give deaths per 100 million miles and speed limits.

Row	deaths X	SpLim Y
1	3.1	55
2	3.4	55
3	3.5	55
4	3.6	70
5	4.2	55
6	4.4	60
7	4.8	55
8	5.0	60
9	6.2	75

These sums have been calculated for you. $\sum x = 38.2$, $\sum x^2 = 169.86$, $\sum y = 540$ and $\sum y^2 = 32850$. Please calculate the following:

- The sample standard deviations of X and Y (4) **Note that $\bar{y} = 60.00$ and $s_y = 7.50$.**
- The sample covariance between X and Y . (3)
- The sample correlation between X and Y . (2)
- Given the size and sign of the correlation, what conclusion might you draw on the relation between speed and safety if this were the only evidence available? (1)
- Assume that the death rate in all 9 countries fell by .1. What would be the new values of \bar{x} , s_x , s_{xy} and r_{xy} . Use only the values you computed in a-c and rules for functions of X and Y to get your results. If you state the results without explaining why, or change X and recompute the results, you will receive no credit. (4).

III. Do at least 4 of the following 6 Problems (at least 12 each) (or do sections adding to at least 48 points - Anything extra you do helps, and grades wrap around) . **Show your work!** Please indicate clearly what sections of the problem you are answering! If you are following a rule like $E(ax) = aE(x)$ please state it! If you are using a formula, state it! If you answer a 'yes' or 'no' question, explain why! If you are using the

Poisson or Binomial table, state things like n , P or the mean. Avoid crossing out answers that you think are inappropriate - you might get partial credit. Choose the problems that you do carefully – most of us are unlikely to be able to do more than half of the entire possible credit in this section!)

1. Assume that the amount of paid time (in days) lost by a blue-collar worker during a 3-month period is $N(1.4, 1.3)$. I take a random sample of 10 workers and record the time they lost in the last 3 months..

- a. What is the probability that a randomly picked worker lost paid time exceeding 1.5 days in the 3-month period? (2)
- b. What is the probability that all 10 workers in the sample lost paid time exceeding 1.5 days in the 3-month period? (2)
- c. What is the probability that at least one of the workers in the sample lost paid time exceeding 1.5 days in the 3-month period? (2)
- d. What is the probability that the average amount of paid time lost time exceeded 1.5 days in the three month period? (2)
- e. What is the probability that the total amount of time lost by the sample of 10 workers exceeded 15 days in the three month period. (2)
- f. Looking at the distribution of the sample mean in this problem, give a value of the sample mean that will be above the mean we actually observe 95% of the time (the 95th percentile) (2)