

Stat 1040:

Midterm 1 & 2, Fall 2002

Statistics 1040, Section 006, Midterm 1 (200 Points)

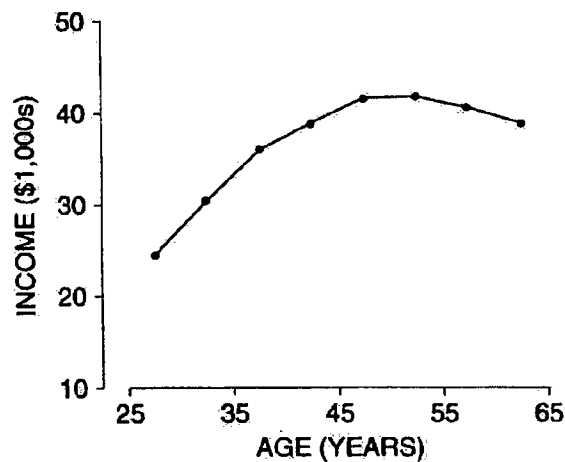
October 4, 2002

Your Name: _____

Question 1: Representative Sample (25 Points)

The graph below summarizes the results from a study based on a representative sample of men age 25–64 in 1993, who were working full time that year; the graph shows average income for each age group.

True or false, and explain: the data show that on average, if a man keeps working, his income will increase until age 50 or so, then start decreasing. If false, how do you account for the pattern in the data?



Source: March 1993 Current Population Survey; CD-ROM supplied by the Bureau of the Census through the U.C. Survey Research Center.

Question 2: Normal Distribution (45 Points)

According to the U.S. Department of Agriculture, one 3-ounce serving of trimmed sirloin beef contains, on average, 7.4 grams of fat. Assume that the amount of fat for such servings closely follows the normal curve, with a standard deviation of 0.4 gram.

Fill the blanks in the statements below and **show all the work needed to obtain the answer**:

1. (15 Points) The proportion of servings that contain between 6.9 and 7.1 grams of fat is _____.

2. (15 Points) The proportion of servings that contain more than 8.3 grams of fat is _____.

3. (15 Points) Only 1% of the servings will contain less than _____ grams of fat.

Question 4: Guessing the Correlation Coefficient (40 Points)

Match the four scatterplots with their correlations from the list:

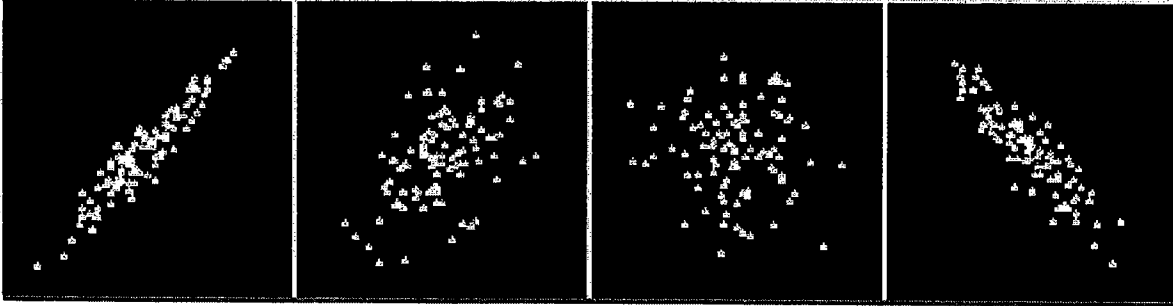
-1.03, -0.99, -0.89, -0.50, -0.05, 0.50, 0.93, 1.03

Plot A

Plot B

Plot C

Plot D



Correlation for Plot A: $r =$ _____

Correlation for Plot B: $r =$ _____

Correlation for Plot C: $r =$ _____

Correlation for Plot D: $r =$ _____

Question 5: Regression (60 Points)

Pearson and Lee obtained the following results in a study of about 1,000 families:

average height of husband ≈ 68 inches, $SD \approx 2.7$ inches,
average height of wife ≈ 63 inches, $SD \approx 2.5$ inches, $r \approx 0.25$.

Show all the work needed to obtain the answer.

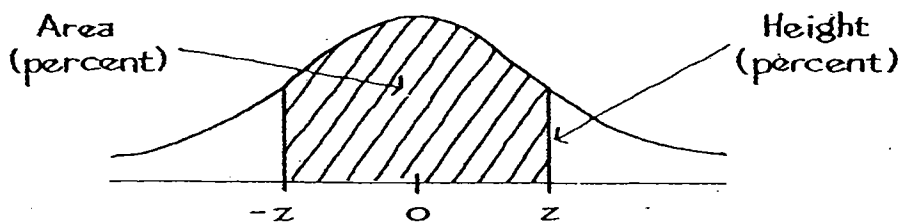
1. (15 Points) Predict the height of a wife when the height of her husband is 72 inches.

2. (15 Points) Predict the height of a wife when the height of her husband is 68 inches.

3. (15 Points) Predict the height of a wife when the height of her husband is unknown.

4. (15 Points) Predict the height of a husband when the height of his wife is 68 inches.

A NORMAL TABLE



<i>z</i>	<i>Area</i>	<i>z</i>	<i>Area</i>	<i>z</i>	<i>Area</i>
0.00	0	1.50	86.64	3.00	99.730
0.05	3.99	1.55	87.89	3.05	99.771
0.10	7.97	1.60	89.04	3.10	99.806
0.15	11.92	1.65	90.11	3.15	99.837
0.20	15.85	1.70	91.09	3.20	99.863
0.25	19.74	1.75	91.99	3.25	99.885
0.30	23.58	1.80	92.81	3.30	99.903
0.35	27.37	1.85	93.57	3.35	99.919
0.40	31.08	1.90	94.26	3.40	99.933
0.45	34.73	1.95	94.88	3.45	99.944
0.50	38.29	2.00	95.45	3.50	99.953
0.55	41.77	2.05	95.96	3.55	99.961
0.60	45.15	2.10	96.43	3.60	99.968
0.65	48.43	2.15	96.84	3.65	99.974
0.70	51.61	2.20	97.22	3.70	99.978
0.75	54.67	2.25	97.56	3.75	99.982
0.80	57.63	2.30	97.86	3.80	99.986
0.85	60.47	2.35	98.12	3.85	99.988
0.90	63.19	2.40	98.36	3.90	99.990
0.95	65.79	2.45	98.57	3.95	99.992
1.00	68.27	2.50	98.76	4.00	99.9937
1.05	70.63	2.55	98.92	4.05	99.9949
1.10	72.87	2.60	99.07	4.10	99.9959
1.15	74.99	2.65	99.20	4.15	99.9967
1.20	76.99	2.70	99.31	4.20	99.9973
1.25	78.87	2.75	99.40	4.25	99.9979
1.30	80.64	2.80	99.49	4.30	99.9983
1.35	82.30	2.85	99.56	4.35	99.9986
1.40	83.85	2.90	99.63	4.40	99.9989
1.45	85.29	2.95	99.68	4.45	99.9991

Statistics 1040, Section 006, Midterm 2 (200 Points)

November 8, 2002

Your Name: _____

Question 1: The Expected Value and Standard Error (40 Points)

A hundred draws are made at random with replacement from the box

1	2	3	4	5	6
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1. (5 Points) If the sum of the draws is 321, what is their average?
2. (5 Points) If the average of the draws is 3.78, what is the sum?
3. (30 Points) Estimate the chance that the average of the draws is between 3 and 4.

Question 3: Regression (50 Points)

In a study between the amount of rainfall and the quantity of air pollution removed, the following data were collected:

Daily rainfall (*mm*): Average = 5, SD = 1.5

Air pollution removed (in $\mu\text{g}/\text{m}^3$ particles removed): Average = 122, SD = 9.5

Correlation = -0.98.

1. (15 Points) Find the regression equation for predicting the air pollution removal from the amount of daily rainfall.
2. (10 Points) Using your regression equation, predict the air pollution removal when the daily rainfall is 4.8 *mm*.
3. (10 Points) Find the r.m.s. error for predicting the air pollution removal from the amount of daily rainfall.
4. (15 Points) Would you be surprised if you read that the daily rainfall of 4 mm had removed the amount of air pollution of 150 $\mu\text{g}/\text{m}^3$? Why or why not? Explain your reasoning, using the r.m.s. error.

Formulas:

$$\text{r.m.s. error} = \sqrt{1 - r^2} \times \text{SD}_y$$

$$\text{slope} = r \times \frac{\text{SD}_y}{\text{SD}_x}$$

$$\text{intercept} = \text{avg}_y - \text{slope} \times \text{avg}_x$$

$$\text{box average} = \frac{\text{sum of all numbers in box}}{\text{how many numbers in box}}$$

$$\text{box SD} = \sqrt{\text{average of } [(\text{deviations from box average})^2]}$$

$$\text{EV}_{\text{sum}} = \text{number of draws} \times \text{box average}$$

$$\text{SE}_{\text{sum}} = \sqrt{\text{number of draws} \times \text{box SD}}$$

Shortcut formulas for a box that contains only *two* different numbers:

$$\text{average} = \frac{(\text{smaller} \times \text{how many}) + (\text{bigger} \times \text{how many})}{\text{how many tickets in the box}}$$

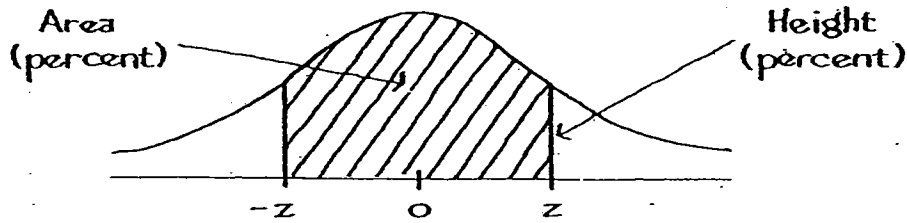
$$\text{SD} = (\text{bigger} - \text{smaller}) \times \sqrt{\frac{\text{fraction}}{\text{bigger}} \times \frac{\text{fraction}}{\text{smaller}}}$$

Shortcut formulas for a box that contains only $\boxed{0}$'s and $\boxed{1}$'s:

$$\text{average} = \frac{\text{number of } \boxed{1} \text{'s}}{\text{how many tickets in the box}}$$

$$\text{SD} = \sqrt{\frac{\text{fraction}}{\text{of } \boxed{1} \text{'s}} \times \frac{\text{fraction}}{\text{of } \boxed{0} \text{'s}}}$$

A NORMAL TABLE



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