

1. An urn contains 5 red marbles, 6 white marbles, and 7 blue marbles.
Six marbles are drawn at random from the urn, one at a time, without replacement.

(5 points) (a) Find the **probability** of getting the sequence
“red, white, white, blue, blue, blue”.

(5 points) (b) Find the **probability** of getting the combination “1 red, 2 white, 3 blue”.

- (8 points) 2. Given the bivariate data

x	1	2	3	4
y	9	4	4	2

(a) find the **correlation coefficient, r**

(b) find the slope-intercept **equation** of the line of best fit

- (9 points) 3. We get half our light bulbs from store A, and one fourth from each of stores B and C.
Only 1% of bulbs from A are defective, but 1.5% of those from B are defective, and
2.5% of those from C are defective.

(a) Make a complete labeled table to apply Bayes' Theorem

(b) Find the overall rate of defectives in our light bulbs. _____

(c) What is the probability that a defective bulb came from store B? _____

ELEMENTARY STATISTICS SAMPLE FINAL EXAM QUESTIONS
SHOW ALL CALCULATIONS. SIMPLIFY ANSWERS. PAGE 2 OF 4.

- (6 points) 4. Let X be the number of successes in $n = 13$ independent binomial trials, where the probability of success in one trial is $p = 0.6$. Find $P(X > 11)$ using appropriate formulas. (Do not use normal approximation.)
- (10 points) 5. Let X be the number of successes in $n = 1300$ independent binomial trials, where the probability of success in one trial is $p = 0.6$. Estimate $P(X \approx 800)$ using the normal approximation to the binomial.
- (6 points) 6. A machine makes parts whose weights are normally distributed with a mean of 30 grams and a standard deviation of 0.32 gram. Find the percentage of parts that weigh between 29.5 and 30.5 grams.
- (5 points) 7. Let x be normal with S.D. = 9. We wish to test the null hypothesis $H_0 : \mu = 60$, (versus $H_a : \mu \neq 60$) with $\alpha = 0.05$. We want the standard error of the sample mean to be 4, or less. Find the minimum sample size, n , needed to achieve this.

GO TO PAGE 3.

8. A sample from a normal population has mean equal to 16 and S.D. equal to 2.
Find the 90% confidence interval for the population mean, if

(6 points) (a) the sample size is 400.

(7 points) (b) the sample size is 10.

9. Independent samples are taken from two normal populations.
 $n_1 = 15$, $n_2 = 18$, $s_1 = 4$, $s_2 = 8$, $\bar{x}_1 = 80$, $\bar{x}_2 = 95$

(6 points) (a) Test the hypothesis that $\sigma_1 = \sigma_2$, at the 10% level.

(7 points) (b) Test the hypothesis that $\mu_1 = \mu_2$, (versus $\mu_1 \neq \mu_2$), at the 5% level.

(10 points) 10. In a test of drugs A and B, the following results were obtained.
 Test the hypothesis that there is no difference between the two drugs,
 at the 10% level.

	Worse	Same	Improved	
Drug A	25	20	50	
Drug B	15	20	30	

(10 points) 11. A researcher tests drugs A, B and C, and uses a quantitative measure
 of improvement. Three groups of people tried the drugs with results below.
 Use ANOVA and test the hypothesis that the mean improvement is the same for
 all three drugs, at the 5% level.

Drug A	Drug B	Drug C
10	6	8
9	8	8
8	7	6
9	11	7
11		7
11		

(100 points, total.)