

Math 141                      **NEATLY PRINT NAME:** \_\_\_\_\_

Exam 3    **STUDENT ID:** \_\_\_\_\_

Fall 2008    **DATE:** \_\_\_\_\_

Scarborough

FORM L                                      **SECTION:**    503 (10:20am)      521 (11:30am)      523 (1:50pm)

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

\_\_\_\_\_  
Signature of student

Academic Integrity Task Force, 2004  
<http://www.tamu.edu/aggiehonor/FinalTaskForceReport.pdf>

My signature in this blank allows my instructor to pass back my graded exam in class or allows me to pick up my graded exam in class on the day the exams are returned. If I do not sign the blank or if I am absent from class on the day the exams are returned, I know I must show my Texas A&M student ID during my instructor's office hours to pick up my exam.

Signature of student \_\_\_\_\_

**MULTIPLE-CHOICE: There is no partial credit on the multiple-choice questions. You must circle the correct answer(s) on each to receive credit on the multiple-choice questions.**

**Work Out: Write all solutions in the space provided as full credit will not be given without complete, correct accompanying work, even if the final answer is correct. Fully simplify all your answers, and give exact answers unless otherwise stated. Justify your answers algebraically whenever possible; state any special features or programs you use on your calculator. Put your final answer in the blank provided. Remember your units!**

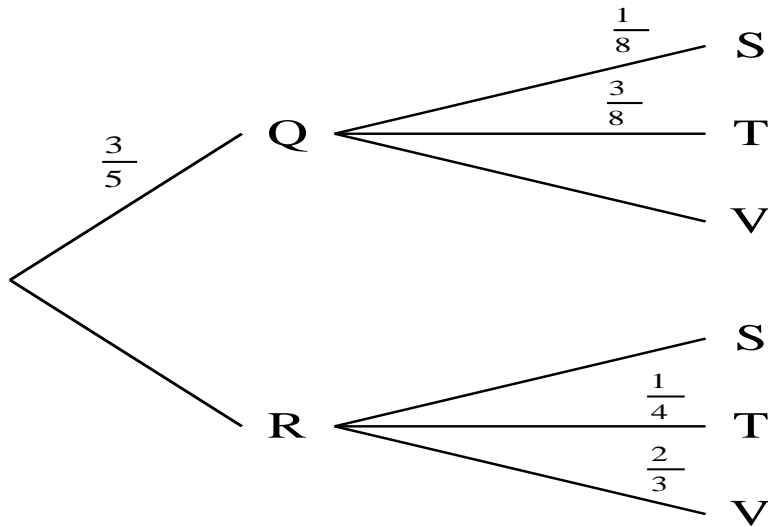
**You must clear your calculator. MEM (2<sup>nd</sup> +), Reset, ALL, Reset**

*One cannot escape the feeling that mathematical formulas have an independent existence and intelligence of their own, that they are wiser than we are.*

Heinrich Hertz

**For the next three problems:** Use the following probability tree to answer the following questions.

1. (3 pts) Complete the probability tree. Give all probabilities as *exact fractions*.



2. (5 pts) Compute  $P(Q^C \cap S)$ .

- $\frac{1}{12}$
- $\frac{61}{120}$
- $\frac{19}{40}$
- $\frac{1}{30}$
- None of these

3. (5 pts) Compute  $P(R|S)$ .

- $\frac{4}{13}$
- None of these
- $\frac{40}{3}$
- $\frac{1}{12}$
- $\frac{1}{30}$

4. (5 pts) A top secret business uses fingerprints and iris (colored part of the eye) patterns to identify an employee. The fingerprint and iris tests are independent events. The probability of correctly identifying an employee by his/her fingerprints is 0.96, and the probability of correctly identifying an employee by his/her iris patterns is 0.985. What is the probability a person will be correctly identified by one or both methods?

- a. None of these
- b. 0.9750
- c. 0.9456
- d. 0.9994
- e. 0.9450

5. (5 pts) The lifespan of a timing belt is normally distributed with a mean of 87,000 miles and a standard deviation of 8100 miles. If the warranty on the belt guarantees 73,200 miles of usage, what is the probability of the belt failing outside of the guarantee of the warranty, rounded to four decimal places?

- a. 0.0018
- b. 0.0442
- c. 0.4557
- d. 0.9558
- e. None of these

**For the next two problems:** A vase contains 5 red, 4 yellow, 6 pink, and 2 white roses.

6. (5 pts) If you select 3 roses at random, what is the probability you draw at least 2 red roses?

- a.  $\frac{3}{17}$
- b.  $\frac{1}{34}$
- c. None of these
- d.  $\frac{5}{6188}$
- e.  $\frac{13}{68}$

7. (5 pts) If you select 4 roses at random, what are the odds of drawing 4 pink roses?

- a. 3:476
- b. 473:476
- c. 3:473
- d. 1:594
- e. None of these

8. (5 pts) The mass of a particular kind of turkey is normally distributed with a mean of 20 kg with a standard deviation of 3.4 kg. The top 10% by mass are rated as grade A, the next 16% are rated as grade B, the next 28% are rated as grade C, the next 36% are rated as grade D, and the remaining lowest, by mass, are rated as grade F. What is the least and greatest turkey mass, respectively, to one decimal place, which would get a C rating?

- a. 18.0 kg, 19.5 kg
- b. 20.3 kg, 22.2 kg
- c. 19.7 kg, 21.2 kg
- d. None of these
- e. 19.7 kg, 22.2 kg

9. (5 pts) Game Depot recently conducted an online poll of 5000 of its customers. The results of the poll are summarized below.

	Supports purchasable add-on content	Opposes purchasable add-on content	No opinion
Bought Band Hero 7	1032	516	164
Did not buy Band Hero 7	1151	1924	213

If a customer who did not buy Band Hero 7 is selected at random, then what is the probability that he/she opposes the notion of purchasable add-on content, rounded to four decimal places?

- a. 0.3848
- b. 0.5852
- c. 0.7885
- d. 0.6576
- e. None of these

10. In a certain board game, players determine the number of spaces they move forward by rolling a pair of dice. If the roll of the dice ends up with both faces the same, however, their game piece is removed from play for two turns. The random variable  $X$  represents the number of turns taken before a roll with matching numbers on both dice appears.

- a. (3 pts) The random variable for this experiment is

Finite discrete      Infinite discrete      Continuous      **(Circle one)**

- b. (2 pts) The set of possible values for this random variable is **(Circle one)**

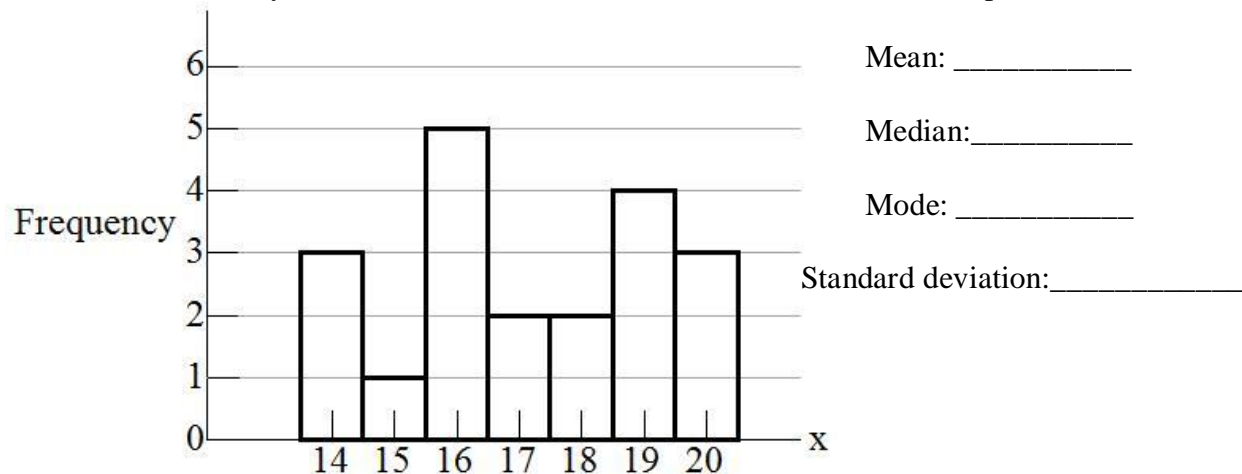
$\{x \mid x \text{ is real number and } x > 0\}$

$\{1, 2, 3, 4, 5, 6\}$

$\{1, 2, 3, 4, 5, 6, \dots, 34, 35, 36\}$

$\{1, 2, 3, 4, \dots\}$

11. (8 pts - 2 pts each) Using the given histogram, determine the mean, median, mode, and standard deviation for the associated random variable  $X$ . Give exact values for the mean, median and mode and round your answer for the standard deviation to three decimal places.



12. (3 pts) A consumer product testing group measures the stopping distance for various models of cars traveling at 20 mph. The random variable  $X$  denotes the distance between the braking line and the point at which the car comes to a complete stop.

The random variable for this experiment is

Finite discrete      Infinite discrete      Continuous      **(Circle one)**

**For the next two problems:** A company that manufactures 2GB flash memory cards used in digital cameras has determined that 6.7% of these cards are not properly formatted for first-time use in a camera.

13. (5 pts) Determine the probability, rounded to four decimals, that in a batch of 2500 flash memory cards, exactly 150 cards are not properly formatted.

- a. 0.0000
- b. 0.0122
- c. 0.0073
- d. 0.0853
- e. None of these

14. (5 pts) *Use the appropriate normal distribution to approximate this binomial probability.* Determine the probability, rounded to four decimal places, that in a batch of 2500 flash memory cards, no more than 135 cards are improperly formatted.

- a. 0.0052
- b. 0.0041
- c. 0.0047
- d. 0.0043
- e. None of these

15. (5pts) Let  $Z$  be the standard normal variable. To four decimal places, find the value of  $P(Z > 1.8)$ .

- a. 0.0790
- b. 0.9641
- c. None of these
- d. 0.7881
- e. 0.0359

16. (5 pts) The probability that a new DVD is defective is 0.09. There is a sample of 5200 new DVDs. What is the probability, to 4 decimal places, that at least 421 but no more than 460 new DVDs are defective?

- a. None of these
- b. 0.3504
- c. 0.3490
- d. 0.3603
- e. 0.0168

17. (6 pts) A game of chance at a high school carnival involves dropping a baseball coated in paint from the roof of a building onto a board divided into three regions of different sizes labeled with the numbers 1 to 3. The probabilities of hitting each of the numbered regions are listed below, along with the prize amount for landing in each region.

Region	1	2	3
Probability	0.010	0.015	0.065
Cash Prize	\$60	\$40	\$10

If each drop of the baseball costs \$2, what are the expected net earnings of a single drop of the baseball in this game? Remember your units.

18. (6 pts) An experiment consists of randomly drawing two bills out of a box without replacement containing three \$1 bills, and two \$5 bills, and observing the sum of money of the two bills. Find a probability distribution for the outcomes of this experiment. Give all probabilities as *exact fractions*.

19. (9 pts) A cell-phone service company offers three plans based on the number of daytime minutes available each month. In a sample of 500 customers, 86 chose the 1500-minute plan, 223 chose the 3000-minute plan, and 191 chose the 5000-minute plan. Also 6% of customers who chose the 1500-minute plan exceeded the allotted number of minutes, 0.892% of the customers sampled chose the 3000-minute plan *and* exceeded the allotted number of minutes, and 97% of customers who chose the 5000-minute plan did not exceed the allotted amount. Construct the probability tree diagram for this experiment. Use only exact values for probabilities.