



1. Of 180 tourists, 60 will go to New Zealand (Z) and the rest will go to Australia (A). Forty-five of the New Zealand tourists will snorkel (S), while the rest will take a nature hike (H). Sixty-five percent of the Australia tourist will snorkel (S), while the rest will take a nature hike (H).

(6pts) a. Draw a probability tree diagram to represent this problem using exact fractions in simplest terms to indicate the appropriate probabilities on each branch.

(4pts) b. If you randomly select one tourist from this group, what is the probability you select a hiker in Australia?

- a.  $\frac{7}{20}$
- b.  $\frac{14}{19}$
- c.  $\frac{7}{30}$
- d.  $\frac{1}{12}$
- e. none of these

\_\_\_\_\_ (4pts) c. If you randomly select a snorkeler, what is the probability, as an exact fraction in simplest terms, you select a tourist who goes to New Zealand?

2. Thirteen percent of stars are super stars.

(4pts) a. What is the probability, rounded to four decimal places, at least 110 out of 825 stars, chosen at random, would be super stars?

- a. 0.6360
- b. none of these
- c. 0.3640
- d. 0.5968
- e. 0.4032

(4pts) b. What is the expected number of super stars out of 825 stars?

- a. none of these
- b. 107.25 super stars
- c. 10.36 super stars
- d. 332.67 super stars
- e. 93.31 super stars

(4pts) c. What is the standard deviation of the number of super stars out of 825 stars?

- a.  $\sqrt{93.3075}$  super stars
- b.  $\sqrt{82.5825}$  super stars
- c. none of these
- d. 9 super stars
- e. 93 super stars

(4pts) 3. A Bose sound system has a probability 0.9% of being defective. Use the appropriate normal distribution to approximate this binomial probability, to four decimal places, that more than 10 of 800 systems are defective.

- a. 0.0771
- b. 0.1083
- c. 0.1123
- d. none of these
- e. 0.1946

(4pts) 4. Before being allowed in a top-secret government lab, a federal employee must pass two biometric identification tests: iris recognition and facial patterns. If the iris recognition is 99.5% reliable and the facial patterns is 98% reliable, what is the probability that an improperly identified person will be allowed to enter the top-secret lab?

- a. 0.249
- b. 0.0001
- c. 0.025
- d. 0.00001
- e. none of these

(4pts) 5. If there are 12 whippets and 8 Labrador retrievers, what is the probability, to four decimal places, that at least 1 of them will be a whippet if 6 dogs are chosen at random?

- a. 0.0007
- b. 0.9762
- c. none of these
- d. 0.9993
- e. 0.9959

\_\_\_\_\_ (5pts) 6. A vase contains 5 terra cotta, 6 aqua, and 7 poppy balls. If a sample of 3 balls is chosen at random, what is the **probability**, *as an exact fraction in simplest terms*, of getting 1 aqua or 2 poppy balls?

- a.  $\frac{209}{272}$
- b. none of these
- c.  $\frac{167}{272}$
- d.  $\frac{21}{136}$
- e.  $\frac{9}{272}$

7. One hundred students were asked how many gallons of water they used in a week to take showers. The results are shown in the table.

Gallons of water used	20	25	35	40	44	52
Number of students	5	9	5	31	24	26

(3pts) a. Find median number of gallons used.

- a. 41.48 gallons
- b. 40 gallons
- c. 42 gallons
- d. none of these
- e. 8.97717 gallons

(3pts) b. Find the mode.

- a. none of these
- b. 52 gallons
- c. 42 gallons
- d. 36 gallons
- e. 40 gallons

\_\_\_\_\_ (4pts) 8. Find the value of  $z$ , to four decimal places, that satisfies  $P(-z < Z < z) = 0.3857$ .

\_\_\_\_\_ (5pts) 9. Ryan and William play a game that uses just the 13 heart cards that are well-shuffled. If Ryan draws an ace, then William pays Ryan \$6. If Ryan draws a face card, then William pays Ryan  $X$  dollars, and if Ryan draws a numbered card (2 through 10), then Ryan pays William \$2. Find the value of  $X$  that makes this game fair. If needed round your answer to the nearest cent.

(3pts) 10. Give an example of a random variable that is continuous.

11. Yelling scores on the Yell Leader entrance exam have a mean of 120 with a standard deviation of 12.4. Assume a normal distribution.

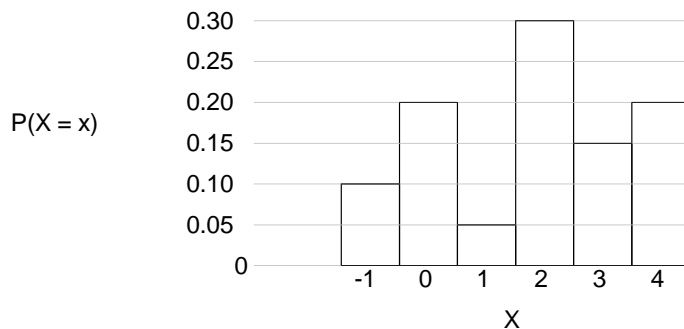
\_\_\_\_\_ (4pts) a. What score, to the nearest integer, corresponds to the 75<sup>th</sup> percentile?

\_\_\_\_\_ (4pts) b. Of 500 yell leader applicants, rounded down to the nearest whole applicant, predict how many will make greater than 140 on the entrance exam?

(4pts) 12. Circle all of the following statements that are true.

- The standard deviation of a finite-discrete random-variable occurs where the highest rectangle in a probability histogram is.
- The sum of the areas of all the rectangles in a probability histogram is one.
- The maximum possible height of any rectangle in a probability histogram must be less than one.
- The variance is the measure of the spread of the data about the expected value.
- The probability associated with more than one value of a finite-discrete random-variable  $X$  is given by the sum of the areas of the probability histogram rectangles associated with those values of  $X$ .

13. Given the histogram.



(4pts) a. Find the value of the mean.

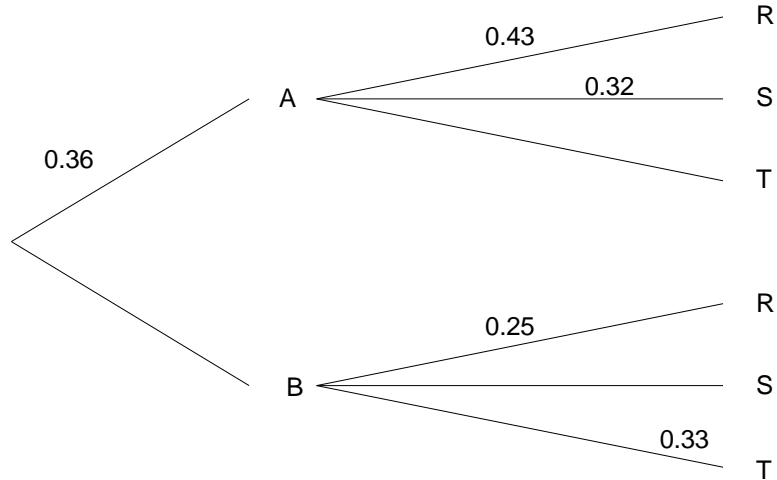
- 2.0
- 1.5
- none of these
- 0.30
- 1.8

(4pts) b. Find the standard deviation to four decimal places.

- 1.6310
- 2.6600
- 1.7078
- none of these
- 0

(3pts) \_\_\_\_\_ c. Find the  $P(X > 1)$ .

14. Use the given tree to answer the following questions.



(4pts) a. Compute  $P(B \cap R)$ .

- a. 0.25
- b. 0.16
- c. 0.64
- d. 0.51
- e. none of these

(4pts) b. Compute  $P(A \cup T)$ .

- a. none of these
- b. 0.7824
- c. 0.0900
- d. 0.2112
- e. 0.5712

(4pts) c. Compute  $P(S | B)$ .

- a. 0.2688
- b. 0.4200
- c. 0.7000
- d. none of these
- e. 0.5800

(4pts) d. Compute  $P(T^c)$ .

- a. 0.5800
- b. none of these
- c. 0.3012
- d. 0.6988
- e. 0.4200