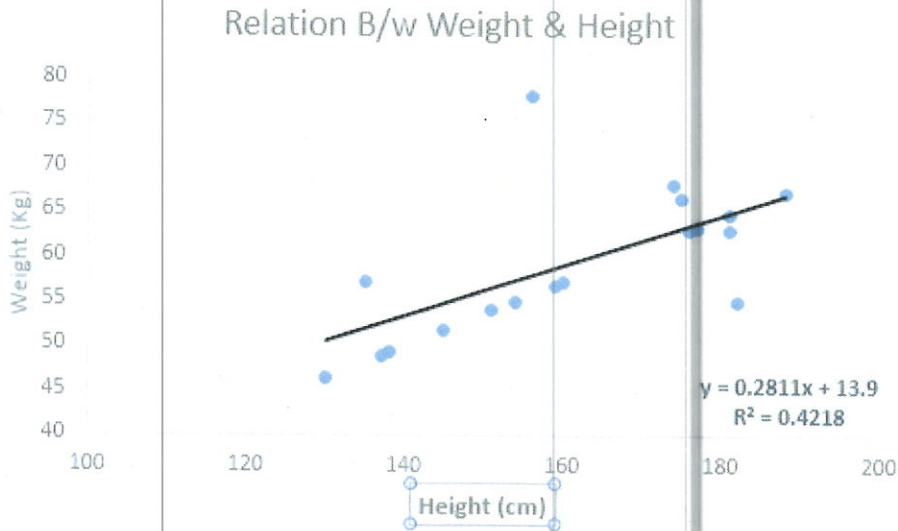


**Instructions:** Show all work. If you show no work, your answer will be graded as all or nothing. If you should work, partial credit is available. Be sure to answer all parts of each question. If you use your calculator to solve problems, say which functions you used and what you entered (as work).

1. The graph below shows a scatterplot with the linear regression line and coefficient of determination shown. Use this information to answer the questions that follow.



- a. What is the correlation coefficient? Should its sign be positive or negative? (5 points)

$r = .64946\dots$  Positive since slope is positive

- b. Use the regression equation to predict the average weight of a person who is 175 cm tall. (This is roughly equivalent to someone 5'9".) (5 points)

63.09 kg (roughly 139 lbs)

- c. What is the prediction for the average weight of someone who is only 100 cm tall? Is this extrapolation reasonable based on the data graphed? Explain. (6 points)

42.01 kg This isn't crazy, but it is extrapolation beyond range of original data and so should be cautious

- d. Interpret the slope in the context of the problem using appropriate units. (5 points)

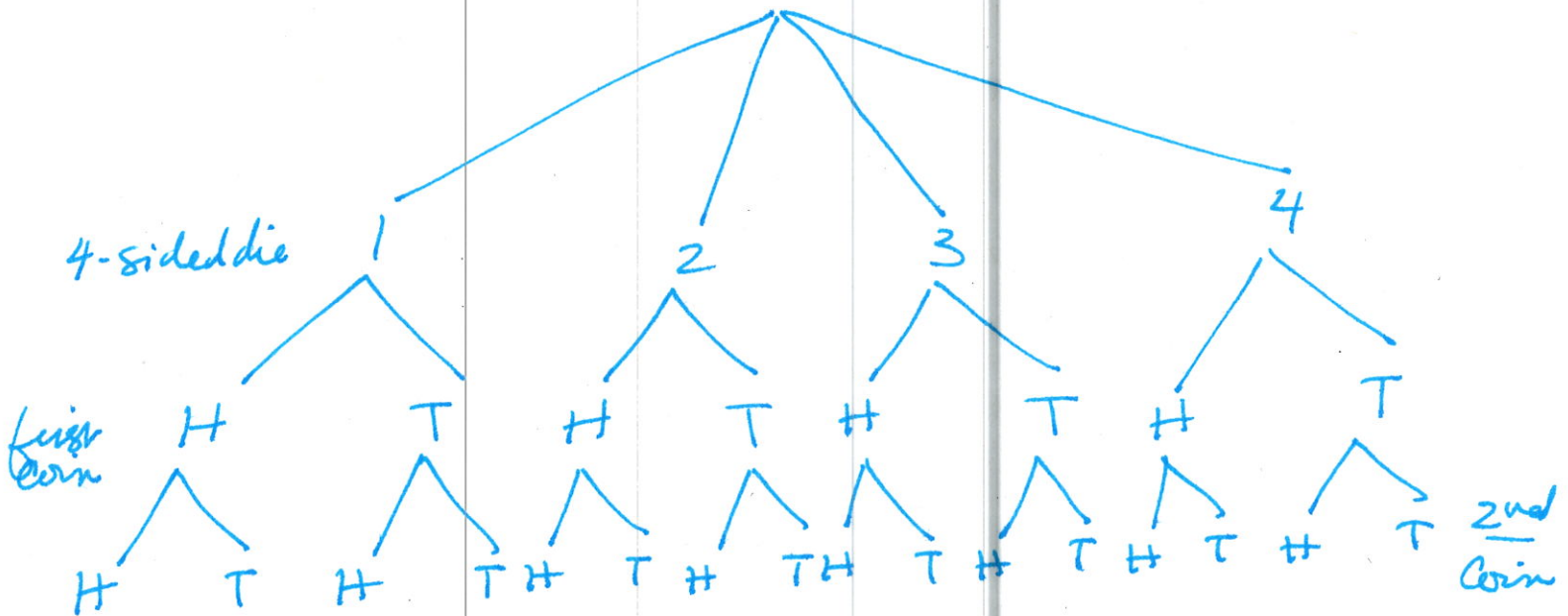
for each cm taller, one can expect average weight to increase by .28 kg.

2. Does the table below represent a legitimate probability distribution? Why or why not? (5 points)

Number of Orders per Week $x_i$	Probability $p_i$
41	.03
42	.10
43	.15
44	.17
45	.25
46	.15
47	.10
48	.05

yes, it does  
since the probabilities  
add to 1.

3. Use a tree diagram to find the sample space of rolling a 4-sided die (sides numbered 1-4), and two coins (outcomes are Head and Tails). Then use the sample space to find the probability of obtaining a 4 and one tail. (10 points)



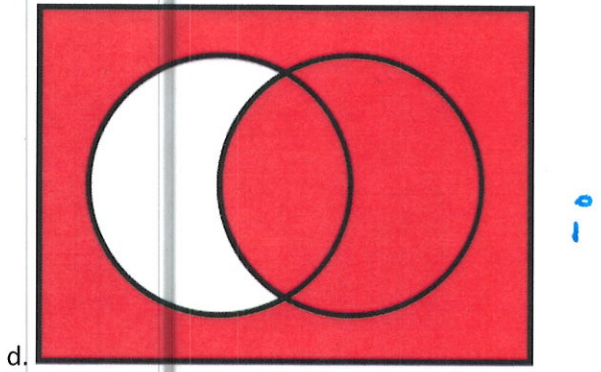
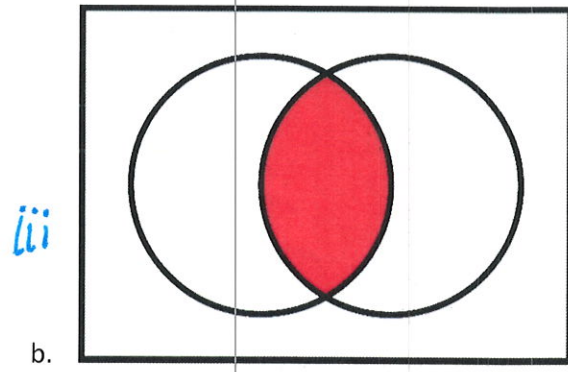
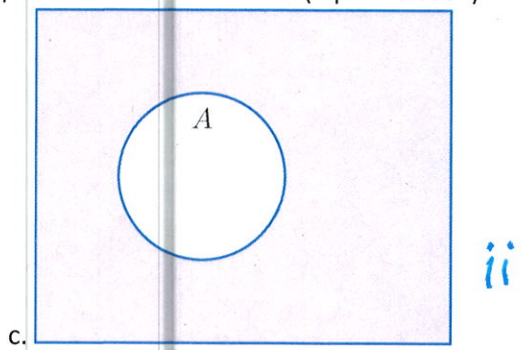
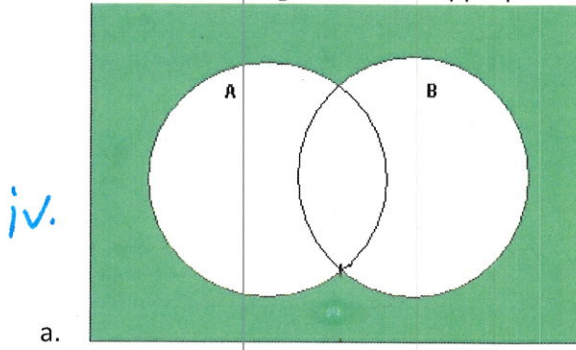
Sample space:  $\{1HH, 1HT, 1TH, 1TT, 2HH, 2HT, 2TH, 2TT, 3HH, 3HT, 3TH, 3TT, 4HH, 4HT, 4TH, 4TT\}$

16 total

$$\frac{2}{16} = \frac{1}{8}$$

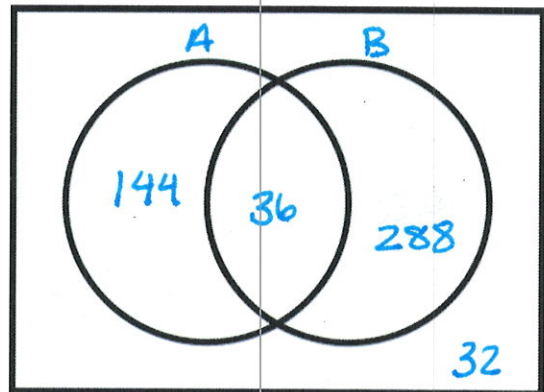
$$\begin{array}{l} \checkmark \\ 4 + 1 \text{ tail} \\ = 2 \end{array}$$

4. Match the Venn diagrams to the appropriate expression in set notation. (3 points each)



- i.  $B \cup A^c = D$
- ii.  $A^c = C$
- iii.  $A \cap B = B$
- iv.  $(A \cup B)^c = A$

5. Rewrite the Two-Way Table as a Venn Diagram using the diagram provided, and then answer the following questions. (6 points)



	Pierced	Not pierced	Total
Male	36	144	180
Female	288	32	320
Total	324	176	500

$A = \text{Male}$   
 $B = \text{Pierced}$

a. What is the probability that a randomly selected individual from the sample has pierced ears? (5 points)

$$\frac{324}{500}$$

b. What is the probability that a randomly selected person from the sample is male? (5 points)

$$\frac{180}{500}$$

- c. What is the probability that a randomly selected person from the sample is both male and has pierced ears? (5 points)

$$\frac{36}{500}$$

- d. What is the probability that a randomly selected person from the sample is either male or has pierced ears? (5 points)

$$\frac{180}{500} + \frac{324}{500} - \frac{36}{500} = \frac{468}{500}$$

- e. Is being gender and having pierced ears independent? Why or why not? Show a calculation to illustrate your conclusion. (7 points)

*dependent*

$$\text{both} = \frac{36}{500} \quad \text{but} \quad \frac{324}{500} \cdot \frac{180}{500} = \frac{729}{3125} \approx .233 \neq .072 = \frac{36}{500}$$

6. You choose a card from a standard deck of 52 cards.

- a. What is the probability that the card you chose is a queen? (5 points)

$$\frac{4}{52}$$

- b. What is the probability that the next card you choose is a jack if you are still holding the queen? (5 points)

$$\frac{4}{51}$$

7. Five blue marbles, ten red marbles, seven yellow marbles, and eleven black marbles are mixed together in a bowl.

- a. What is the probability of selecting a red marble, a black marble and then a blue marble? (6 points)

$$\frac{10}{33} \cdot \frac{11}{32} \cdot \frac{5}{31} = \frac{25}{1488} \approx .0168$$

- b. What is the probability of selecting a green marble? (3 points)

$$0$$

**Bonus:**

8. We have 11 people running for four positions for a club: president, vice president, secretary and treasurer. How many different ways can these positions be filled? (4 points)

$$11P4 = 7920$$

9. When calculating the number of passwords available, would you use the multiplication rule, permutations or combinations? Explain. (5 points)

*multiplication rule (repetition is allowed)*

10. Thirty-two women graduate students sign-up for a room-sharing program at a conference to help defray costs of attending. How many different ways can the first room be assigned if four women are assigned to each room? (5 points)

$$32C4 = 35,960$$

11. Calculate the value of the following expressions: (2 points each)

a.  $13P5$

$$154,440$$

b.  $81C14$

$$\approx 1.8 \times 10^{15}$$

c.  $12!$

$$479,001,600$$

d.  $\binom{25}{7}$

$$480,700$$