

1) (2 points each) Write the sample space associated with each experiment:

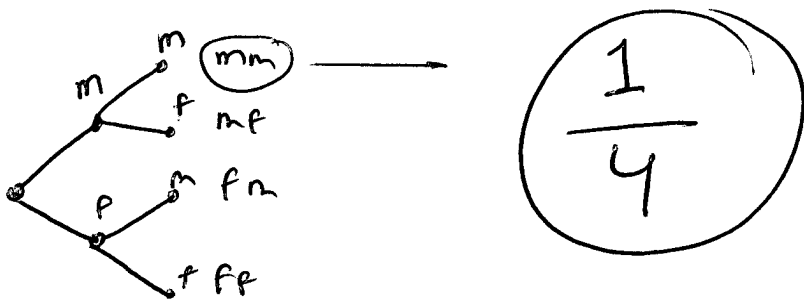
a) The gender of a child born:

$\{m, f\}$

b) The genders of an older child and a younger child:

$\{mm, mf, fm, ff\}$

2) (5 points) When two children are born, what is the probability of having two boys? Draw a tree diagram to support your answer:



3) (3 points each) Consider the data below showing students who recently graduated:

	Bachelor's Degree	Master's Degree	Doctoral Degree	Total
Male	12	15	20	47
Female	6	22	25	53
Total	18	37	45	100

Picking a student at random, what is the probability...

a) They are Male?

$\frac{47}{100}$

b) They earned a Master's Degree?

$\frac{37}{100}$

c) They are a Female and they earned a Doctoral Degree?

$\frac{25}{100} = \frac{1}{4}$

18

4) (4 points each) The Annual Math Talent Show is coming up. This year's finalists for the grand prize are Mr. Abacus, Sir Binomial, Lady Combination, Mrs. Derivative, and Lord E.

a) How different ways can the acts perform?

$$\underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} = 120$$

b) How many ways can Mr. Abacus perform first and Lady Combination second?

$$\underline{1} \cdot \underline{1} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} = 6$$

c) What is the probability that Mr. Abacus performs first and Lady Combination second?

$$\frac{6}{120} = \frac{1}{20}$$

d) What is the probability that Sir Binomial or Lord E perform first?

$$\underline{2} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} = \frac{48}{120} = \frac{2}{5}$$

5) (4 points each) Consider picking a card from a standard deck of cards.

a) What is the probability of picking a Jack or a Queen?

$$\frac{4+4}{52} = \frac{8}{52} = \frac{2}{13}$$

b) What is the probability of picking a Spade or a Face Card?

$$\frac{13+12-3}{52} = \frac{22}{52} = \frac{11}{26}$$

c) What is the probability of picking a Face Card and a Heart?

$$\frac{3}{52}$$

d) What is the probability of picking a Face Card and a Seven?

$$\frac{0}{52} = 0$$

e) What are the odds of picking a Spade?

$$13 \text{ to } 39$$

$$1 \text{ to } 3$$

f) What are the odds of picking a Spade or a Face Card?

$$22 \text{ to } 30$$

$$11 \text{ to } 15$$

$$40$$

6) (4 points each) Consider picking a card from a deck of cards. What is the probability that...

- a) A Face Card was picked given you picked a Club?      b) A Club was picked given you picked a Face Card?

$$\frac{3}{13}$$

$$\frac{3}{12} = \frac{1}{4}$$

- c) A Club was picked that is also a Face Card?

$$\frac{3}{52}$$

- d) A Club was picked given you did not pick a Face Card?

$$\frac{13-3}{52-12} = \frac{10}{40} = \frac{1}{4}$$

7) (4 points each) At a crazy math party, Mike served some (non-alcoholic) beverages in two different flavors: Grape and Apple. He had 13 glasses of Grape and 7 glasses of Apple. If 3 people came by and each took a beverage, what is the probability that...

- a) All of them took a glass of Apple?      b) None of them took a glass of Apple?

$$\frac{C(7,3)}{C(20,3)} = \frac{35}{1140} = \frac{7}{228}$$

$$\frac{C(13,3)}{C(20,3)} = \frac{286}{1140} = \frac{143}{570}$$

8) (4 points) The probability that people in Ohio will complain about the amount of snow in any given year is 72%. Suppose for 6 years, you researched if people in Ohio would complain about the amount of snow. Writing your answer as a percent rounded to three decimal places, what is the probability that people from Ohio will complained for...

- a) Four years?

$$C(6,4)(.72)^4(.28)^2 = 31.604\%$$

- b) At least 4 years?

$$E \times 4 \quad \text{or} \quad E \times 5 \quad \text{or} \quad E \times 6$$

$$C(6,4)(.72)^4(.28)^2 + C(6,5)(.72)^5(.28)^1 + C(6,6)(.72)^6(.28)^0 = 78.042\%$$

9) Extra credit: Explain why Problem #7 is not a binomial probability but #8 was:

gobble gobble.

10) At a local fair, a raffle is being held where 1,000 tickets were sold for \$25 each. There is one first place prize of \$2,000, two second place prizes of \$500, and five third place prizes of \$100 each.

a) (6 points) Determine the expected net value of the game. Round answer to two decimal places.

$$\frac{1}{1000} \cdot 1975 + \frac{2}{1000} \cdot 475 + \frac{5}{1000} \cdot 75 + \frac{992}{1000} \cdot (-25) = -21.50$$

1st
2nd
3rd
lose

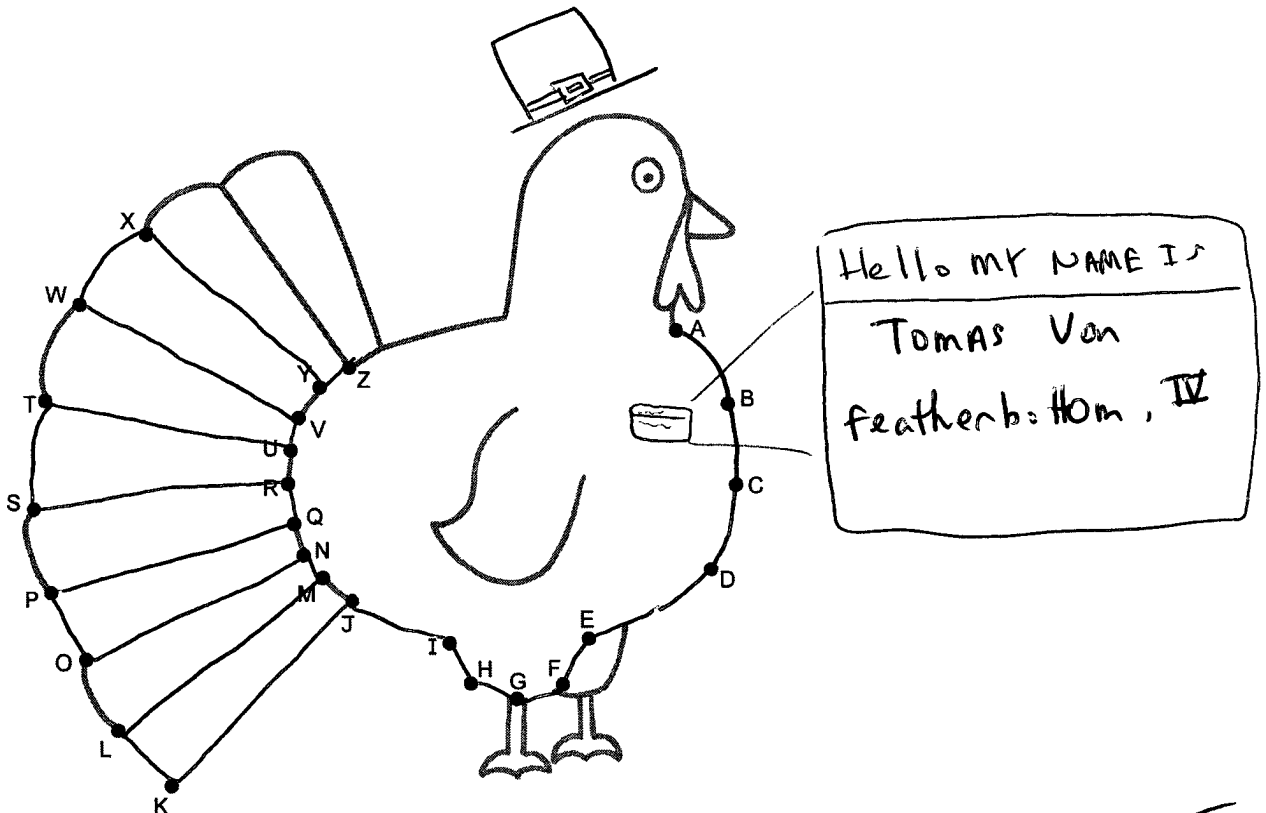
b) (2 points) Is this game fair to play? Why or why not?

Nope, Expected to lose!

11) (1 point each) What are the appropriate ways of writing...

a) Probability

b) Odds



FO/R