## DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

- ❖ Write your name below on the space provided.
- ❖ This test has a total of 6 pages. Feel free to tear off the last page. I do not need it returned.
- ❖ Work the problem in the space provided.  If you need more space, write on the back of the test and be sure to mark the test to let me know the work is on the back. Label work accordingly.
- ❖ To insure maximum credit, show your work.  In general, full credit will not be given for unsupported answers.
- ❖ Look only at your test.
- ❖ Connect the dots on page five and then give the turkey a name for something extra.
- ❖ Be sure to write neatly and in pencil.  If I cannot read what was written or it is not in pencil, do not expect the problem to be graded.
- ❖ If you finish early, go over the test again.

### Good luck!

| Number | Maximum | Score |
|--------|---------|-------|
| 1 | 4 | |
| 2 | 5 | |
| 3 | 9 | |
| 4 | 16 | |
| 5 | 24 | |
| 6 | 16 | |
| 7 | 8 | |
| 8 | 8 | |
| 9 | EC 2 | |
| 10 | 8 | |
| 11 | 2 | |
| Total | 100 | |

Name _____

# Circle final answers

## Reduce as needed

This font be crazy fancy

1) (2 points each)  Write the sample space associated with each experiment:
a)  The gender of a child born:          b)  The genders of an older child and a younger child:

2) (5 points)  When two children are born, what is the probability of having a 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** | 29 | 10 | 8 | 47 |
| **Female** | 32 | 17 | 15 | 64 |
| **Total** | **61** | **27** | **23** | **111** |

Picking a student at random, what is the probability…
a)  They are Male?                          b)  They earned a Master's Degree?

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

4) (4 points each) The Annual Math Talent Show is coming up. This year's five 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?

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

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

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

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

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

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

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

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

e) What are the **odds** of picking a Spade?

f) What are the **odds** of picking a Face Card and a Diamond? (*Hint*: Use your answer in part *c*)

6) (4 points each) At an artsy film festival, 30 people are being surveyed on the movies they watched. It was found that 17 have seen the movie *Tacos: A Documentary*, 18 have seen the movie *Tom Hanks is Tom Hanks in Every Movie Starring Tom Hanks*, and 12 have seen both. Picking a person at random, what is the probability that…

a) They have seen *Tacos* or *Tom Hanks*?

b) They have seen *Tacos* given they have seen *Tom Hanks*?

c) They have seen *Tom Hanks* given they have seen *Tacos*?

d) They have seen *Tacos* given they did not see *Tom Hanks*?

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?

8) (4 points) The probability that people in Ohio will complain about the amount of snow in any given year is 79%. 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?

b) At least 4 years?

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

10) At a local fair, a raffle is being held where 2,000 tickets were sold for $30 each. There is one first place prize of $2,500, two second place prizes of $1000, and five third place prizes of $500 each.
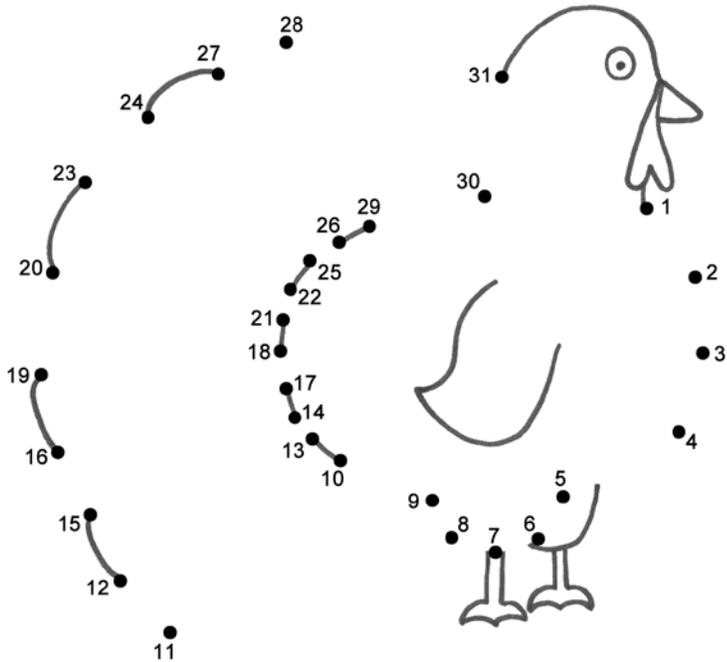
a) (6 points) Determine the expected **net** value of the game. Round answer to two decimal places.

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

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

a) Probability

b) Odds

# Chapter 3 formulas

Factorial: $n! = n(n-1)(n-2) \cdot \ldots \cdot 3 \cdot 2 \cdot 1$

Permutation: $P(n,r) = \dfrac{n!}{(n-r)!}$     Combination: $C(n,r) = \dfrac{n!}{r!(n-r)!}$

Probability to Odds for an Event: $P(E)$ to $P(\text{not } E)$ reduced

Probability to Odds against an Event: $P(\text{not } E)$ to $P(E)$ reduced

Odds to Probability for event E $a$ to $b$ imply $P(E) = \dfrac{a}{a+b}$

Odds to Probability against event E $a$ to $b$ imply $P(E) = \dfrac{b}{a+b}$

Addition Formula: $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

Conditional Probability: $P(E \mid F) = \dfrac{P(E \text{ and } F)}{P(F)}$

Product Formula: $P(E \text{ and } F) = P(F) \times P(E \mid F)$

Complement Formula: $P(\text{not } E) = 1 - P(E)$

Binomial Probability: $C(n,r)(p)^r (q)^{n-r}$