

# MATH 362—Work Sheet 08

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Due on Sunday, February 28th, 2021

Name: \_\_\_\_\_

## ★ SOLUTIONS ★

1. (1 point) A flush in poker is a five card hand where each card has the same suit. What's the probability of a flush?

choose a suit  $\rightarrow \frac{\binom{4}{1} \binom{13}{5}}{\binom{52}{5}}$   $\leftarrow$  choose 5 from that suit

$\{ \heartsuit \diamondsuit \clubsuit \spadesuit \}$

2. (1 point) How many ways are there to choose 12 donuts from the 22 varieties of donuts at a donut shop?

22 options = 21 bars  
12 donuts = 12 stars

$$\frac{(21+12)!}{21! 12!}$$

$\rightarrow \binom{21+12}{12}$

3. (2 points) How many ways can you give 10 cookies to 4 distinct people, assuming each person gets at least 1 cookie?

Give 1 cookie to each  $\Rightarrow$  6 left

4 people  $\Rightarrow$  3 bars  $\rightarrow \binom{9}{3} = \frac{(3+6)!}{3! 6!}$

4. (2 points) Assume that  $P(\text{Woman} \mid \text{Yoga Person}) = 75\%$ . What's the probability that a 10 person yoga class has at least 8 women in it?

$$\binom{10}{8} \left(\frac{3}{4}\right)^8 \left(\frac{1}{4}\right)^2 + \binom{10}{9} \left(\frac{3}{4}\right)^9 \left(\frac{1}{4}\right) + \left(\frac{3}{4}\right)^{10}$$

$\sim 52.5\%$

5. (6 points) I can land a heel flip [https://youtu.be/2A2P\\_tcqaz8](https://youtu.be/2A2P_tcqaz8) once out of every 42 attempts.

(a) (2 points) What's the probability that I'll land a heel flip in the first 3 attempts?

$$\left(\frac{1}{42}\right) + \left(\frac{41}{42}\right) \left(\frac{1}{42}\right) + \left(\frac{41}{42}\right)^2 \left(\frac{1}{42}\right)$$

$$= 1 - \left(\frac{41}{42}\right)^3 \sim 6.9\%$$

(b) (2 points) What's the probability that I'll land a heel flip after 5 tries?

$$P(N > 5) = \left(\frac{41}{42}\right)^5 \approx 88.64\%$$

(c) (2 points) How many times should I try to do a heel flip to make it more than 50% likely that I'll land at least one heel flip?

$$(\log_e 2) \times (42) \sim 28 \text{ or } 29 \text{ times}$$

6. (2 points) Challenge Problem: How many 5-digit numbers have their digits in non-decreasing order? Examples include: 55555 and 12345. Non-examples include 12343. Hint: This is a stars and bars problem.

It's a challenge!



$$\begin{array}{c|c|c|c|c} 0 & 1 & 2 & \dots & 9 \\ \hline * & * & * & * & * \end{array} \rightsquigarrow \binom{14}{5}$$

or exclude 0  $\rightsquigarrow \binom{13}{5}$