1/20/17 Start of class exercises

1. 2^5
2. 10
3. 5
4. 1
5.
6. $\frac{10}{32} = \frac{5}{16}$

#heads: 0 1 2 3 4 5

#ways to get: 1 5 10 10 5 1

```
          1
        1   1
      1   2   1
    1   3   3   1
  1   4   6   4   1
1   5   10  10  5   1
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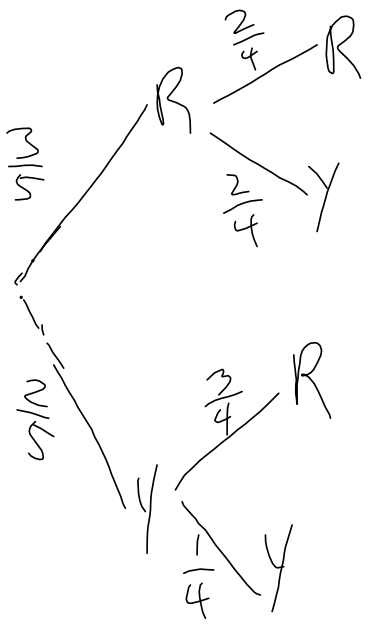
H T H T T $\quad n = 5^{\text{coins}} \quad k = 2$

2 heads $\quad n_1 = 2^{\text{heads}} \quad n_2 = 3^{\text{tails}}$

#ways is $\frac{5!}{2!3!} = \frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1 \cdot 3 \cdot 2 \cdot 1} = 10$

1 heads $\rightarrow \frac{5!}{1!4!} = 5$

Urn, 3 red tiles, 2 yellow
Draw 2 w/o replacement.
What is prob of exactly 1 red?



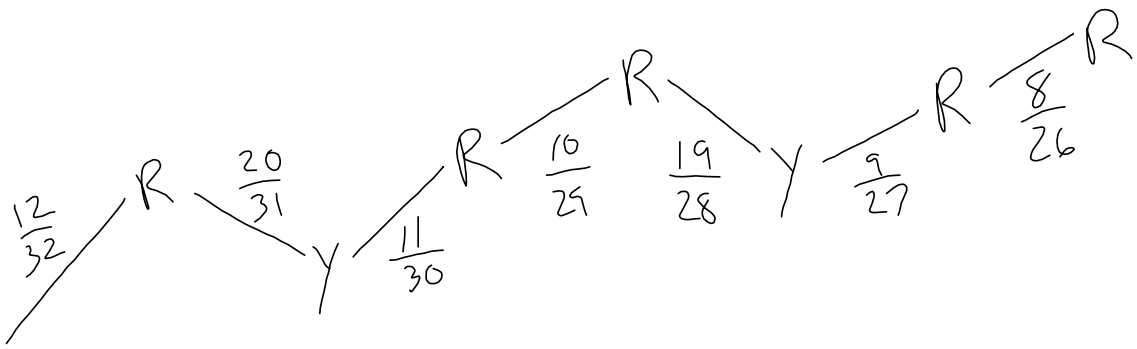
$P(RR) = \frac{6}{20}$

$P(RY) = \frac{3}{5} \cdot \frac{2}{4} = \frac{6}{20}$

$P(YR) = \frac{2}{5} \cdot \frac{3}{4} = \frac{6}{20}$

$P(YY) = \frac{2}{20}$

12 red, 20 yellow
draw 7 w/o replacement
What is prob of exactly 2 yellow? (and exactly 5 red)



$$P(RYRRRYRR) = \frac{12 \cdot 20 \cdot 11 \cdot 10 \cdot 19 \cdot 9 \cdot 8}{32 \cdot 31 \cdot 30 \cdot 29 \cdot 28 \cdot 27 \cdot 26}$$

$P(YRRRRRYR)$ is same

$$= \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 20 \cdot 19}{32 \cdot 31 \cdot \cdots \cdot 26}$$

# of ways to get exactly two yellow in 7 draws is

$$\frac{7!}{2!5!} = \frac{7 \cdot 6}{2 \cdot 1} = 21 \text{ ways}$$

$$P(\text{exactly 2 yellow}) = 21\left(\frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 20 \cdot 19}{32 \cdot \cdots \cdot 26}\right)$$

Experiment: Flip a coin once, roll 4 sided die. H3

$S = \{H1, H2, H3, H4, T1, T2, T3, T4\}$

$f(x) = x^2$ $f: \mathbb{R} \to \mathbb{R}$ Range of f is $[0, \infty)$

Define a random variable

$X : S \to \mathbb{R}$

by this: heads counts as 0 and tails counts as one. 1-4 on die count as 1-4. X of an outcome is the die # minus the coin #

$\overline{X}(H3) = 3 - 0 = 3$

$\overline{X}(T1) = 0$

$\overline{X}(H1) = 1$

$P(X = 2) = \frac{2}{8}$

$P(X \leq 2) = \frac{5}{8}$

x	f(x)

outcome	X(outcome)	Y
H1	1	1
H2	2	2
H3	3	3
H4	4	4

	X	Y
T1	0	0
T2	1	0
T3	2	0
T4	3	0