

Name SOLUTIONS

(circle your lab section)

- ▷ **AB1**, Fri 11:00-12:40, Brian Benson ▷ **AB2**, Thu 3:00-4:40, Paul Spiegelhalter
 ▷ **AB3**, Thu 1:00-2:40, Brian Benson ▷ **AB4**, Fri 1:00-2:40, Paul Spiegelhalter

- No calculators are allowed.
- Simplify each answer.

1. (3 points) A race involves 6 runners. First, second, and third place awards are made. How many possible outcomes are there for the awards?

$$6 \cdot 5 \cdot 4 = 120$$

2. (2 points) How many subsets of $\{a, b, c, d, e\}$ contain 3 elements?

$\{a, b, c\}$, $\{a, b, d\}$, $\{a, b, e\}$, $\{a, c, d\}$, $\{a, c, e\}$,
 $\{a, d, e\}$, $\{b, c, d\}$, $\{b, c, e\}$, $\{b, d, e\}$, $\{c, d, e\}$

10

also found using

$${}_5 C_3 = \frac{5 \cdot 4 \cdot 3}{3 \cdot 2 \cdot 1} = 10$$

$$\text{or } {}_5 C_3 = \frac{5!}{2!3!} = 10$$

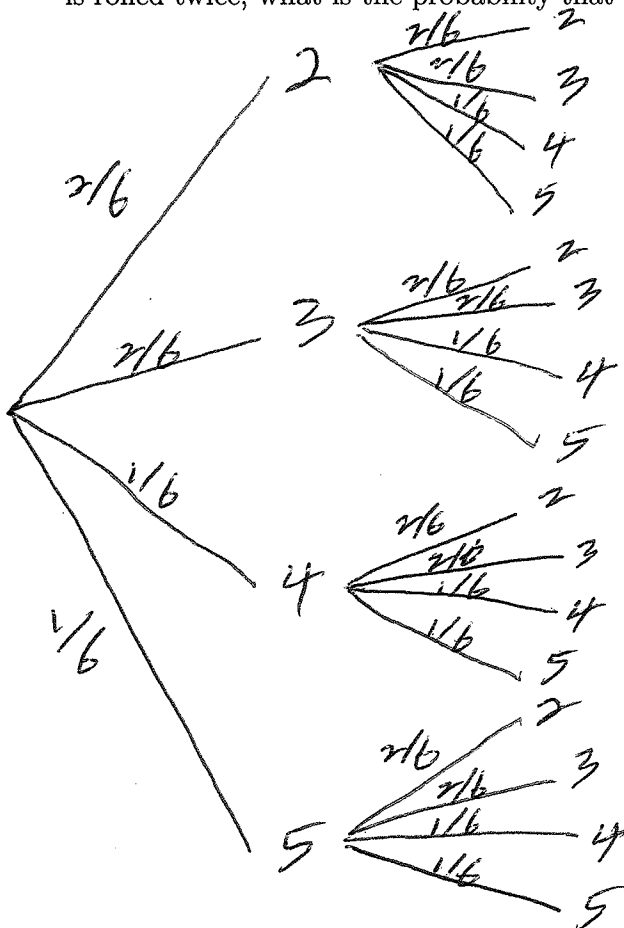
3. (3 points) A container has 3 red marbles, 1 blue marble, and 1 green marble. If you randomly select two of these marbles without replacement, what is the probability that both of them are red?

$$\frac{3}{5} \cdot \frac{2}{4} = \frac{6}{20} = \frac{3}{10}$$

or

$$\frac{{}^3C_2}{{}^5C_2} = \frac{3 \cdot 2 / (2 \cdot 1)}{5 \cdot 4 / (2 \cdot 1)} = \frac{3}{10}$$

4. (2 points) Each of the six faces of a die is equally likely to occur when the die is rolled. However, instead of 1 through 6, the numbers on the faces are 2, 2, 3, 3, 4 and 5. If the die is rolled twice, what is the probability that the sum of the two results is equal to 7?



$$P(2+5) = \frac{2}{6} \cdot \frac{1}{6} = \frac{2}{36}$$

$$P(3+4) = \frac{2}{6} \cdot \frac{1}{6} = \frac{2}{36}$$

$$P(4+3) = \frac{1}{6} \cdot \frac{2}{6} = \frac{2}{36}$$

$$P(5+2) = \frac{1}{6} \cdot \frac{2}{6} = \frac{2}{36}$$

$$P(\text{SUM}=7) = 4 \cdot \frac{2}{36} = \frac{8}{36} = \frac{2}{9}$$