MATH 141
ICA # 5

(6 points)
1. Given the following system,

\[ x + y \geq 4 \]
\[ x \geq 1 \]
\[ 0 \leq y \leq 5 \]

(a) Find the exact coordinates of all corner points of the solution set.

(b) Find the maximum value of the objective function, \( P = 3x + 8y \), on the solution set you found in (a), if possible. If not possible, explain why not.

(2 points)
2. Shade the portion of the Venn diagram that represents the set: \( (A^C \cup (B \cap C^C))^C \)

(5 points)
3. Circle whether the following statements are true or false.

(a) True False \{h, o, w, d, y\} has exactly 32 subsets
(b) True False \{a, b\} \cap \{b, c, d\} = b
(c) True False \emptyset \in \{x, y, z\}
(d) True False A strict inequality is graphed with a dashed line.
(e) True False \( C(n, r) \leq P(n, r) \) for all \( r \leq n \)

(1 point)
4. Fill in the blanks below.

An event is a ___________ of the _________________.

\[ \text{(} \]
(3 points)
5. If $A$ and $B$ are disjoint subsets of a universal set, $U$, where $n(U) = 100$, $n(A) = 20$, and $n(B) = 45$, find $n(A^C \cap B^C)$.

(5 points)
6. A secretary has a cup on her desk that is filled with 4 wooden pencils, 10 pens, and 2 mechanical pencils. She randomly selects 6 writing utensils from the cup without looking.

(a) How many different groups with exactly 2 pens and exactly 3 wooden pencils can she grab?

(b) How many different groups with exactly 6 pens or exactly 6 pencils can she grab?

(3 points)
7. You pick a ball at random from a bag with a yellow, a green, and a red ball, noting the color drawn, and then you flip a fair coin, noting the side landing up. Write the appropriate sample space for this experiment.

(4 points)
8. Use the information given in the Venn diagram about a group of surveyed students and the classes they are taking to answer the following questions.

(a) How many students are taking Science and English?

(b) How many students are taking at most one of these classes?

(c) How many students are taking English or Math?

(d) How many students are not taking English?

(6 points)
9. A high school club has 20 total members (8 seniors, 7 juniors and 5 sophomores).

(a) In how many different ways can a President, VP, and Secretary be chosen for the club, if the President must be a senior and the VP and the Secretary must be a junior or a sophomore?

(b) How many different yearbook photos can be taken where all the seniors are in a row behind a row of all the remaining club members?

(c) In how many different ways can a group of 5 be selected from the members of this club?