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ENEL 319 Assignment #1

a = "acceptable"
f = "fail"

Problem 1

a) $S = \{fff, ffa, faf, faa, aff, afa, aaf, aaa\}$

b) $A = \{$ circuit from Z fails $\}$ (so when z is f)

$A = \{fff, faf, aff, aaf\}$

c) $B = \{$ circuit from X acceptable $\}$ (so when x is a)

$B = \{aff, afa, aaf, aaa\}$

d) Are A and B mutually exclusive?

No, $A \cap B \neq \emptyset$ (null) but, $A \cap B = \{aff, aaf\}$

Also, $A \cup B \neq A + B$

To be mutually exclusive: $A \cap B = \emptyset$ (null) and $A \cup B = A + B$ must be true

e) to be collectively exhastive:

$S = A \cup B$

A and B are not collectively exhastive because

{fff, ffa, faf, faa, aff, afa, aaf, aaa}

$\neq$

{fff, faf, aff, afa, aaf, aaa}

f) D = {more than one circuit is acceptable}

D = {faa, afa, aaf, aaa}

g) E = {atleast 2 circuits fails}

E = {fff, ffa, faf, aff}

h) $D \cup E$ = {fff, ffa, faf, faa, aff, afa, aaf, aaa}

= D + E

Yes, D and E are mutually exclusive

i) $S = D \cup E$ = {fff, ffa, faf, faa, aff, afa, aaf, aaa}

Yes, D and E are collectively exhaustive.

Problem 2

a) $A = \{2, 3\}$

b) $B = \{0, 1, 2, 3, 4, 5, 6\}$

c) $C = \{x \mid x^2 - 5x + 6 = 0\}$
$= \{2, 3\}$

$x^2 - 5x + 6 = 0$
$(x-2)(x-3) = 0$
$x = 2 \quad x = 3$

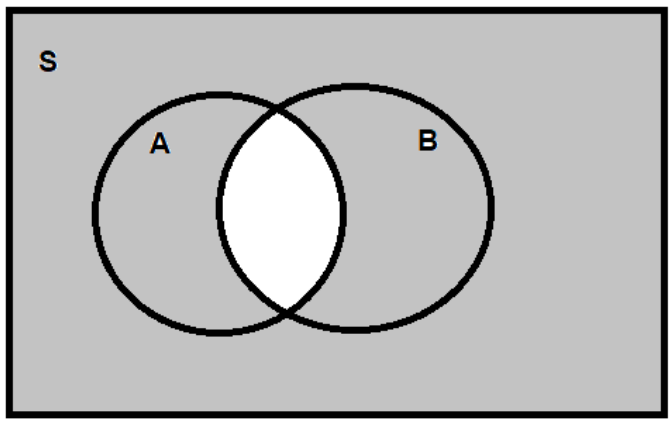
d) $D = \{x \mid x \text{ is the number of heads when six coins are tossed}\}$
$= \{0, 1, 2, 3, 4, 5, 6\}$

$A = C$
$B = D$

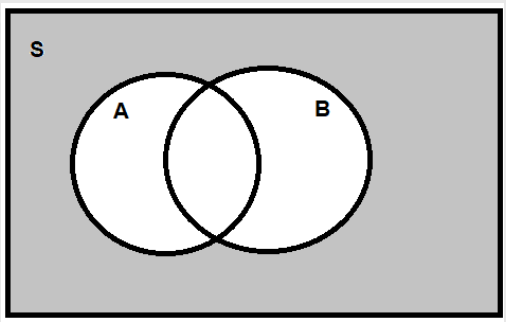
Problem 4:

$C = \overline{A \cap B}$

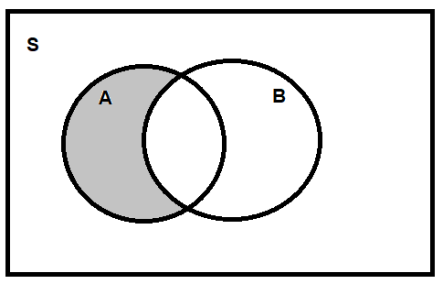
a)



b) $D = \overline{A \cup B}$



c) $A \cap \overline{B}$



Problem 6

a) $= P(A \cup B)$

$= P(A) + P(B) - P(A \cap B) = 0.25 + 0.18 - 0.15$

$= 0.28$

b) $= P(\overline{A \cup B}) = 1 - P(A \cup B) = 1 - (P(A) + P(B) - P(A \cap B))$

$= 1 - (0.25 + 0.18 - 0.15)$

$= 0.72$

c) $P(A \cap \overline{B}) = P(A) \cap (1 - P(B))$

$= P(A) - P(A \cap B) = 0.25 - 0.15$

$= 0.1$