\( P_0 = (ABCDEF)(G) \)

\( P_1 = (ABC)(DE)(FG) \quad [\text{by observing the distinguishing outputs}] \)

0-successors

A \rightarrow F
B \rightarrow G
C \rightarrow B
D \rightarrow C
E \rightarrow D
F \rightarrow E/E

1-successors

A \rightarrow B
B \rightarrow A
C \rightarrow C
D \rightarrow B
E \rightarrow A
F \rightarrow F/G.

1-successors don't give any new info, but 0-succ. do.

\((AB) \rightarrow (FG)\)

\((CDE) \rightarrow BCD\).

\( P_2 = (AB)(C)(DE)(FG) \).

\( P_3 = (AB)(C)(C)(DE)(FG) \) as C's successors are in a different partition than DE's successors.

Similarly, \( D/E \rightarrow C/D \).

\( P_4 = (AB)(C)(D)(E)(FG) \)

\( P_5 = P_4 \quad \text{so} \quad A=B \quad \text{&} \quad F=G \)
Q3

\[ P_0 = (AB)(CD)(E) \]
\[ P_1 = (ABE)(CD) \]
\[ P_2 = (A)(BE)(CD) \]
\[ P_3 = (A)(BE)(C)(D) \] = \[ P_4 \]

Q5

(a) False, minterm ≠ sum of literals = product \[ \prod \]

(b) Yes, that's what K-maps are used for. Generate all primes, & then pick a min # of primes that cover the function.

(c) True.

\[ P_2 = P_1 \cup P_3 \]

(d) False. XOR = not enough on its own. But AND-XOR = universal.

\[ a \lor b = a \oplus b \oplus ab \]
\[ \overline{a} = a \oplus 1 \]
65.

\[ f(ab, cd) = \Sigma(1, 3, 4, 7, 8, 11, 13, 14) \]

de decompose as \( f(g(ca, b), c, d) \).

\[ g = \overline{a}b + ab = a \oplus b. \]

\[ f = \overline{c} \overline{d} \cdot g + \overline{c} d \cdot \overline{g} + cd \cdot g + cd \cdot \overline{g} \]

\[ = g(c \oplus d) + \overline{g} (c \oplus d) = g \oplus (c \oplus d) \]
Q 6. \[ f = (\overline{A+B}) \cdot (\overline{C+D}) \]

\[ = (\overline{A \cdot B}) \cdot (\overline{C \cdot D}) \]

\[ = A \overline{B} + C \overline{D} \]

\[ A \overline{B} + C \overline{D} \rightarrow \text{PNL} \]

\[ \Leftrightarrow \text{PUN} = \text{dual of PNL} \]

\[ q + s = V_{DD} \]

\[ A \rightarrow B \]

\[ C \rightarrow D \]

\[ f \]

\[ A \rightarrow C \]

\[ B \rightarrow D \]

\[ \text{GND} \]