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1) a) 1) $J \to K$
2) $J \to L$
3) $L \to J$
4) $MNP \to K$
5) $KP \to M$
6) $LJ \to N$

Right

1) $J \to K$
$J^+ = \{J, K, L, N\}$ ✓
$J^- = \{J, L, N\}$
2) $J \to L$
$J^+ = \{J, K, L, N\}$ ✓
$J^- = \{J, K\}$
3) $L \to J$
$L^+ = \{L, J, N\}$ ✓
$L^- = \{L\}$ not ext
4) $MNP \to K$
$MNP^+ = \{M, N, P, K\}$ ✓
$MNP^+ = \{M, N, P\}$
5) $KP \to M$
$KP^+ = \{K, P, M\}$ ✓
$KP^+ = \{K, P\}$
6) $LJ \to N$
$LJ^+ = \{L, J, N, K\}$ ✓
$LJ^+ = \{L, J, K\}$
$\{L, J, K, N\}$

Left

4) $MNP \to K$
$M^+ = \{M\}$ ✓
$N^+ = \{N\}$ ✓ not ext
$P^+ = \{P\}$ ✓
5) $KP \to M$
$K^+ = \{K\}$ ✓ not ext
$P^+ = \{P\}$ ✓
6) $LJ \to N$
$L^+ = \{L, J, K\}$
$J^+ = \{J, K\}$

Answer: J is extraneous in $LJ \to N$. It can be rewritten as $L \to N$

b) P is not present in the right side
$P^+ = \{P\}$ ×
$JP^+ = \{P, J, K, L, M, N\}$ ✓
$LP^+ = \{P, L, J, N, K, M\}$ ✓

JP and LP are candidate keys

c) (1, 1, 1, 1, 1, 1)

2) a) $F_c = \{ J \to KL,\ L \to JN,\ MNP \to K,\ KP \to M \}$

b) $R_1 = (J, K, L)$ $R_2 = (L, J, N)$ $R3 = (M, N, P, K)$ $R4 = (P, L)$

c) R cannot be decomposed into BCNF.
(JKL) and (LJN) are in BCNF, but (MNPK) is not because $KP \to N$ and KP is not a candidate key.