Question 1.

α	β
B	C
B	D
D	B
D	C
D	E
E	C
E	D
BE	C
BE	D

Question 2 (a).

1. a→b (given)
2. ac→bc (agumentation of (1) with c)
3. bc→d (given)
4. ac→d (transitivity of (2) and (3))

Question 2 (b).

1. a→b (given)
2. c→d (given)
3. ac→bc (augmentation of (1) with c)
4. bc→bd (augmentation of (2) with b)
5. ac→bd (transitivity of (2) and (3))

Question 3 (a).

1. ABC→E (given)
2. BD→A (given)
3. CG→B (given)
4. CDG→BD (augmentation of (3) with D)
5. CDG→A (transitivity with (4), (3))
6. CDG→CG (reflexivity)
7. CDG→B (transitivity with (6), (3))
8. CDG→BCDG (augmentation of (7) with CDG)
9. BCDG→AB (augmentation of (5) with B)
10. CDG→AB (transitivity with (8), (9))
11. CDG→ABC (augmentation of (10) with C)
12. CDG→E (transitivity with (1), (11))

Question 3 (b).

{CDG}+ = {CDGBAE}

Question 3 (c).

Observe that C, D, and G do not appear in the right hand side of any FD. Therefore, every key of R must contain CDG. Meanwhile, {CDG}+ = {ABCDEG}, which indicates that CDG is the only key.

Question 4.

Observe that A does not appear in the right hand side of any FD. Therefore, every key of R must contain A. Let's consider attribute sets that contain A

- {A}+ = {A}, and hence, A is not a key
- {AB}+ = {ABCDE}, and hence, AB is a key, and any proper superset of AB is not a key.
- {AC}+ = {ACBDE}, and hence, AC is a key, and any proper superset of AC is not a key.
- {AD}+ = {AD}, and hence, AD is not a key.
- {AE}+ = {AE}, and hence, AE is not a key.
- {ADE}+ = {ADE}, and hence, ADE is not a key.
- All other supersets of {A} cannot be keys since they are proper supersets of either AB or AC.

Therefore, there are only two keys: AB and AC.