1.A R1 ∪ R2 = {(3, 3), (1, 2), (2, 2), (1, 1), (1, 3), (1, 4)}

1.B R1 ∩ R2 = {(1, 1)}

1.C R1 − R2 = {(3, 3), (2, 2)}

1.D R2 − R1 = {(1, 2), (1, 3), (1, 4)}

2 S ◦ R, = {(4, 4), (3, 4), (3, 1), (3, 3), (4, 1)}

3 R^2 = {(2, 4), (2, 1), (3, 4), (3, 1), (1, 1), (1, 4)}

4.A Show R as a set of ordered pairs = {(5, -5), (-10, 10), (-3, 3), (-4, 4), (-1, 1), (3, -3), (4, -4), (-6, 6), (10, -10), (-5, 5), (2, -2), (-7, 7), (8, -8), (9, -9), (0, 0), (1, -1), (6, -6), (-9, 9), (7, -7), (-8, 8), (-2, 2)}

4.B Show whether R is reflexive or not = [False, [5, 5], [-5, -5]]

4.C Show whether R is symmetric or not = [True, [[(5, -5), (-5, 5)], [(-10, 10), (10, -10)], [(-3, 3), (3, -3)], [(-4, 4), (4, -4)], [(-1, 1), (1, -1)], [(3, -3), (-3, 3)], [(4, -4), (-4, 4)], [(-6, 6), (6, -6)], [(10, -10), (-10, 10)], [(-5, 5), (5, -5)], [(2, -2), (-2, 2)], [(-7, 7), (7, -7)], [(8, -8), (-8, 8)], [(9, -9), (-9, 9)], [(0, 0), (0, 0)], [(1, -1), (-1, 1)], [(6, -6), (-6, 6)], [(-9, 9), (9, -9)], [(7, -7), (-7, 7)], [(-8, 8), (8, -8)], [(-2, 2), (2, -2)]]]

4.D Show whether R is antisymmetric or not = [True, [[(5, -5), (-5, 5)], [(-10, 10), (10, -10)], [(-3, 3), (3, -3)], [(-4, 4), (4, -4)], [(-1, 1), (1, -1)], [(3, -3), (-3, 3)], [(4, -4), (-4, 4)], [(-6, 6), (6, -6)], [(10, -10), (-10, 10)], [(-5, 5), (5, -5)], [(2, -2), (-2, 2)], [(-7, 7), (7, -7)], [(8, -8), (-8, 8)], [(9, -9), (-9, 9)], [(0, 0), (0, 0)], [(1, -1), (-1, 1)], [(6, -6), (-6, 6)], [(-9, 9), (9, -9)], [(7, -7), (-7, 7)], [(-8, 8), (8, -8)], [(-2, 2), (2, -2)]]]

4.E Show whether R is transitive or not = [False, (5, 5)]