1a. Particle 1: v(i;d) = w\*v(i;d) + r1\*(x\*(i;d) – x(i;d)) + 0.5 \* (x(d) – x(i;d))= 2 \* (2,2) + 0.5\*((5,5 – 5,5)) + 0.5\*((5,5) – (5,5)) = (4,4)

Thus, particle 1’s new position is (9,9).

Particle 2: v(i;d) = w\*v(i;d) + r1\*(x\*(i;d) – x(i;d)) + 0.5 \* (x(d) – x(i;d))= 2 \* (3,3) + 0.5 \* (7,3 – 8,3) + 0.5 \* ((5,5) – (8,3)) = (6,6) + (-0.5,0) + (-1.5,-1) = (4,5)

Thus, particle 2’s new position is (12,8).

Particle 3: v(i;d) = w\*v(i;d) + r1\*(x\*(i;d) – x(i;d)) + 0.5 \* (x(d) – x(i;d))= 2 \* (4,4) + 0.5 \* ((5,6) – (7,5)) + ((5,5) – (7,5)) = (8,8) + (-1,0.5) + (-2,0) = (5,8.5)

Thus, particle 3’s new position is (12,13,5).

1b. Particle 1: v(i;d) = w\*v(i;d) + r1\*(x\*(i;d) – x(i;d)) + 0.5 \* (x(d) – x(i;d))= 0.1 \* (2,2) + 0.5\*((5,5 – 5,5)) + 0.5\*((5,5) – (5,5)) = (0.2,0.2)

Thus, particle 1’s new position is (5.2,5.2).

Particle 2: v(i;d) = w\*v(i;d) + r1\*(x\*(i;d) – x(i;d)) + 0.5 \* (x(d) – x(i;d))= 0.1 \* (3,3) + 0.5 \* (7,3 – 8,3) + 0.5 \* ((5,5) – (8,3)) = (0.3,0.3) + (-0.5,0) + (-1.5, 1) = (-1.7,1.3)

Thus, particle 2’s new position is (6.3,4.3).

Particle 3: v(i;d) = w\*v(i;d) + r1\*(x\*(i;d) – x(i;d)) + 0.5 \* (x(d) – x(i;d))= 0.1 \* (4,4) + 0.5 \* ((5,6) – (6,7)) + ((5,5) – (6,7)) = (0.4,0.4) + (-0.5,-0.5) + (-0.5,-1) = (-0.6,1.9)

Thus, particle 3’s new position is (5.4,8.9).

c. The parameter *w* seems to simulate friction/acceleration for the individual particles.

d. The swarm will make optimize faster but be more imprecise.

2. The particle will find the solution, but very slowly and inefficiently compared to other values of *w*.