Question #1

Given $p_c = (11,2)$, $v_c = (0,4)$, $p_t = (6,6)$, $t = 0.5$, $v_m = 10$ and $a_m = 24$

a) Update 1

$p_t - p_c = (6, 6) – (11, 2) = (-5,4)$

$p_t – p_c / |p_t – p_c| = (-0.78, 0.62)$

$v = (-7.8, 6.2)$

$p'_c = (11,2) + (-7.8, 6.2)(0.5) = \underline{(7.1, 5.1)}$

Update 2

$p_t - p_c = (-1.1, 0.9)$

$p_t – p_c / |p_t – p_c| = (-0.77, 0.63)$

$v = (-7.7, 6.3)$

$p'_c = (7.1, 5.1) + (-7.7, 6.3)(0.5) = \underline{(3.25, 8.25)}$

Update 3

$p_t - p_c = (2.75, -2.25)$

$p_t – p_c / |p_t – p_c| = (0.77, -0.63)$

$v = (7.7, -6.3)$

$p'_c = (3.25, 8.25) + (7.7, -6.3)(0.5) = \underline{(7.1, 5.1)}$

Update 4

$p_t - p_c = (-1.1, 0.9)$

$p_t – p_c / |p_t – p_c| = (-0.77, 0.63)$

$v = (-7.7, 6.3)$

$p'_c = (7.1, 5.1) + (-7.7, 6.3)(0.5) = \underline{(3.25, 8.25)}$

Update 5

$p_t - p_c = (2.75, -2.25)$

$p_t - p_c$ / $|p_t - p_c|$ = (0.77, -0.63)

v = (7.7, -6.3)

p'_c = (3.25, 8.25) + (7.7, -6.3)(0.5) = <u>(7.1, 5.1)</u>

b) <u>Update 1</u>

$p_c - p_t$ = (5, -4)

$p_c - p_t$ / $|p_c - p_t|$ = (0.78, -0.62)

v = (7.8, -6.2)

p'c = (11, 2) + (7.2, -6.2)(0.5) = <u>(15.1, -1.1)</u>

<u>Update 2</u>

$p_c - p_t$ = (9.1, -7.1)

$p_c - p_t$ / $|p_c - p_t|$ = (0.79, -0.62)

v = (7.9, -6.2)

p'c = (15.1, -1.1) + (7.9, -6.2)(0.5) = <u>(19.05, -4.2)</u>

<u>Update 3</u>

$p_c - p_t$ = (13.05, -10.2)

$p_c - p_t$ / $|p_c - p_t|$ = (0.79, -0.62)

v = (7.9, -6.2)

p'c = (19.05, -4.2) + (7.9, -6.2)(0.5) = <u>(23, -7.3)</u>

<u>Update 4</u>

$p_c - p_t$ = (17, -13.3)

$p_c - p_t$ / $|p_c - p_t|$ = (0.79, -0.62)

v = (7.9, -6.2)

p'c = (17, -13.3) + (7.9, -6.2)(0.5) = <u>(26.95, -10.4)</u>

Update 5

$p_c - p_t = (20.95, -16.4)$ $p_c - p_t /$

$|p_c - p_t| = (0.79, -0.62)$ $v = (7.9, -$

$6.2)$

$p'c = (26.95 , -10.4) + (7.9, -6.2)(0.5) = \underline{(30.9, - 13.5)}$

c) Update 1

$p_t - p_c = (6, 6) - (11, 2) = (-5,4)$

$\vec{n} = (-0.78, 0.62)$

$a = (-18.72, 14.88)$

$v = (0, 4) + (-18,72, 14.88)(0.5) = (-9.36, 11.44)$

$p'_c = (11,2) + (-9.36, 11.44)(0.5) = \underline{(6.32, 7.72)}$

Update 2

$p_t - p_c = (-0.32, -1.72)$

$\vec{n} = (-0.18, -0.98)$

$a = (-4.32, -23.52)$ $v = (-11.52, -$

$0.32)$

$p'_c = \underline{(0.56, 7.56)}$

Update 3

$p_t - p_c = (5.41, -1.56)$

$\vec{n} = (0.96, -0.28)$

$a = (23.04, -6.72)$

$v = (0.05, -3.68)$

p'_c = <u>(0.59, 5.72)</u>

<u>Update 4</u>

$p_t - p_c = (5.41, 0.28)$

$\vec{n} = (1, 0.05)$

$a = (24, 1.2)$

$v = (12.05, 0.88)$

p'_c = <u>(6.62, 6.76)</u>

<u>Update 5</u>

$p_t - p_c = (-0.62, -0.16)$

$\vec{n} = (-0.97, -0.25)$

$a = (-23.28, -6)$

$v = (0.41, -2.12)$

p'_c = <u>(6.83, 5.1)</u>

d) <u>Kinematic:</u> The character moves linearly towards the target. If the velocity is too high, the character will overshoot the target and will have to correct. However, because the velocity is still too high, the character will continue to overshoot the target over and over again.

<u>Steering:</u> The character attempts to move towards the target. If the acceleration is too high, the character will overshoot and have to turn around and go back towards the target.

<u>Question #2</u>

a) $p_c = [(21, 6) + (5, 11) + (28, 9)] / 3 = (18, 8.67)$

$v_c = [(3, 1) + (3, 3) + (6, 5)]/3 = (4, 3)$

$\underline{p_{anchor} = (18, 8.67) + (1)(4, 3) = (22, 11.67)}$

b) Character 1: $\Delta p_{si} = (22, 18) - (18, 8.67) = (4, 9.33)$

$\underline{p'_{si} = (22, 11.67) + (4, 9.33) = (26, 21)}$

Character 2: $\Delta p_{si} = (-12, 4.33)$

$\underline{p'_{si} = (10,16)}$

Character 3: $\Delta p_{si} = (11, 3.33)$

$\underline{p'_{si} = (33, 15)}$

c) <u>If killed before a)</u> $p_c = (13, 13.5)$ $v_c = (3, 2)$

$\underline{p_{anchor} = (16, 15.5)}$ Character 1: $\Delta p_{si} = (-11, 4.5)$

$\underline{p'_{si} = (5, 20)}$

Character 2: $\Delta p_{si} = (-7, -0.5)$

$\underline{p'_{si} = (9, 15)}$

The anchor would move to (16, 15.5) and Characters 1 and 2 will take slot positions (5, 20) and (9, 15) respectively.

If Character 3 was killed before b) but after a), then nothing would change because p_{anchor} and p_c were already calculated.