Sample Numeric Integration Calculations

$$m = 10$$
$$k = 5$$
$$f = -kx$$
$$a = f/m = -kx/m = -x/2$$
$$x' = v$$
$$v' = a$$
$$x_{t+1} = x_t + x'_t = x_t + v_t$$
$$v_{t+1} = v_t + v'_t = v_t + a_t$$

Euler:

t	x	v	a	x'	v'
0	20	0	-10	0	-10
1	20	-10	-10	-10	-10
2	10	-20	-5	-20	-5
3	-10	-25	5	-25	5
4	-35	-20	17	-20	17
5	-55	-3	27	-3	27

Midpoint:

t	x	v	a	x'	v'
0.0	20	0	-10	0	-10
0.5	20	-5	-10	-5	-10
1.0	15	-10	-7	-10	-7
1.5	10	-13	-5	-13	-5
2.0	2	-15	-1	-15	-1
2.5	-5	-15	2	-15	2
3.0	-13	1	6	1	6
3.5	-13	4	6	4	6
4.0	-9	7	4	7	4