General Mathematics and CPS II

Exercise 11

March 18, 2015

1. Newton's second law of mechanics for a particle of mass m situated at position $x(t)$ moving with velocity $v(t)$ and subject to a force $F(x(t))$ can be written

$$\frac{\mathrm{d}x}{\mathrm{d}t} = v\,,$$
$$m\,\frac{\mathrm{d}v}{\mathrm{d}t} = F(x(t))\,.$$

   Use the chain rule of calculus to show that the particle satisfies the same equation with t replaced by the reversed time $r = -t$ and v replaced by $-v$.

2. Show that in a time-discrete, reversible, system with a finite number of states any orbit must return to its initial state after a finite number of steps.