1 Separable ODEs

Solve the following differential equations by separation. b and c are constants with the appropriate dimensions.

(a) $\frac{dv}{dt} = ct$ where $v(t = 0) = 55$

(b) $\frac{dp}{dm} = -cp$ where $p(m = 0) = p_0$

(c) $\frac{dz}{dk} = -b - cz$ where $z(k = 0) = z_0$

2 Constant Acceleration by Separation of Variables

(a) ***Calculate***: Treat Newton's 2nd law as a separable differential equation and solve for the velocity and position as a function of time of an object that is all of the following:

- moving in one dimension,
- not initially at the origin of coordinates,
- moving with a non-zero initial speed,
- experiences a constant force.

(b) ***Reflect***: Do your answers look familiar? If yes, from where? If not, how would you have to modify these equations to be similar to equations you know?