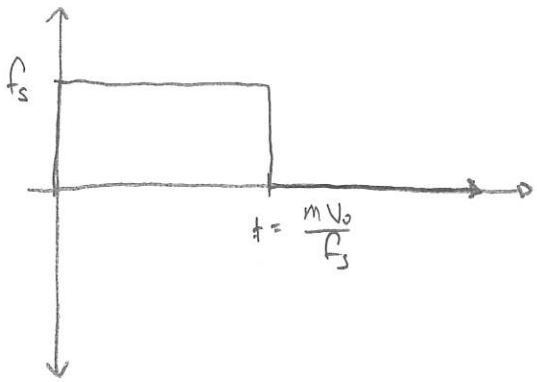
a)



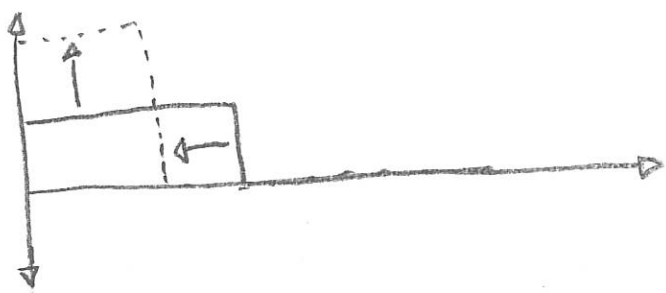
b) $F(t) = f_s\, u(t) - f_s\, u\left(t - \frac{mV_0}{f_s}\right)$

$$\mathcal{L}[F(t)] = \frac{f_s}{s} - e^{-\frac{mV_0}{f_s}t}\,\frac{f_s}{s}$$

c) $\int_0^{\infty} F_s(t)\,dt = f_s \cdot \frac{mV_0}{f_s} = \boxed{mV_0}$

this is the change of momentum of the robot from when it hits the ground, to when it comes to rest

d) The force become greater, but the step time becomes shorter



e) $F(t)$ becones an impulse force, where the force becomes infinite, but the duration of the force is infinitesimally small. The integral $\int_0^{\infty} F(t)\,dt$ is finite though and still mV_0

$\leftarrow F(t) = f(t)\,\delta(t)$