MIE 100S Quiz 1a Jan 12, 2015

First name and Last name printed correctly as seen on ROSI (1 mark)
Legibility and neatness (1 mark)

$$Given: a = \frac{175}{v^2}\frac{m}{s^2} \; and \; v_0 = 30\frac{m}{s}$$

$$\frac{dv}{dt} = a$$
$$\frac{dv}{dt} = \frac{175}{v^2}$$
$$\int v^2 dv = \int 175 \, dt$$
$$\frac{1}{3}v^3 = 175t + C$$

$$Can\ determine\ constant\ from\ initial\ conditions:$$
$$v_0 = v(t = 0) = 30\frac{m}{s}$$

$$Pluging\ into\ equation\ above:$$
$$\frac{1}{3}(30)^3 = 175(0) + C$$
$$C = 9000$$

$$and\ therefore\ v\ is\ given\ by: v = \sqrt[3]{525t + 27000}$$
$$and\ t\ is\ given\ by: t = \frac{v^3}{525} - \frac{9000}{175}$$

$a)\ v(t = 4) = \sqrt[3]{525(4) + 27000} = 30.76\ m/s$

4 marks

$b)\ t(v = 50) = \frac{50^3}{525} - \frac{9000}{175} = 186.67\ s$

4 marks