Homework Questions 4-4-2014

Friday, April 04, 2014
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10.1
(46)

$x = 250\sqrt{3}\,t$ ($t = \frac{x}{250\sqrt{3}}$)

$y = 250t - 4.9t^2$

$x = (v_0 \cos\alpha)t$, $y = (v_0(\sin\alpha)t) - \frac{1}{2}gt^2$

$\alpha = 30^\circ$, $v_0 = 500$ m/s

when bullet hits ground, $y = 0$

$500\left(\frac{1}{2}\right)t - 4.9t^2 = 0$

y → $250t - 4.9t^2 = 0$

$t = ?$

to get h-distance plug ? into $x = 500\frac{\sqrt{3}}{2}t$

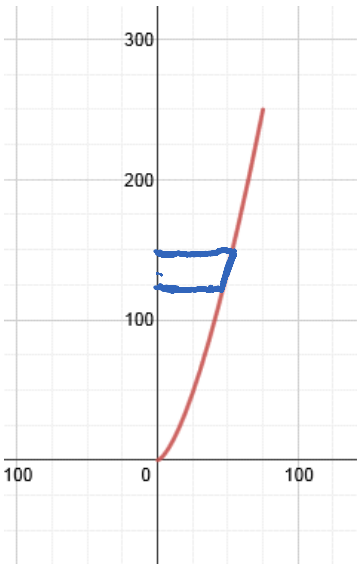
$x = 250\sqrt{3}\,t$

max height? set $\frac{dy}{dt} = 0$ solve for t to get t_0

Plug to into y parametric.

10.2
(65)

$x = 3t^2$, $y = 2t^3$ $\quad 0 \le t \le 5$



Desmos Graphing Calculator
https://www.desmos.com/calculator
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$$S_i = 2\pi r\, ds$$

$$S = 2\pi \int r\, ds$$

$$= 2\pi \int_0^5 3t^2 \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}\, dt$$

$$= 2\pi \int_0^5 3t^2 \sqrt{(6t)^2 + (6t^2)^2}\, dt$$

$$= 2\pi \int_0^5 3t^2 \sqrt{36t^2 + 36t^4}\, dt$$

$3t^2 \cdot 6t$

$$= 2\pi \int_0^5 3t^2 \sqrt{36t^2 \cdot (1+t^2)}\, dt$$

$$= 2\pi \int_0^5 18t^3 \sqrt{1+t^2}\, dt$$

$$= 36\pi \int_0^5 t^3 \sqrt{1+t^2}\, dt$$

$u = 1 + t^2 \rightarrow t^2 = (u-1)$

$du = 2t\,dt$

time-out

$$\int x^{\frac{2}{3}}\sqrt{u}\;\frac{du}{2t}$$

$$\frac{1}{2}\int (u-1)\sqrt{u}\;du$$