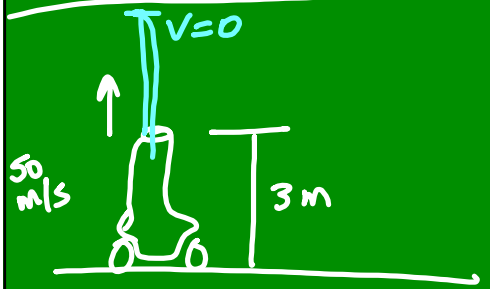
Motion – Part 2 – Vertical

$a = -9.8$ m/s²
$v = -32$ ft/s



$$h(t) = \frac{1}{2}at^2 + V_0 t + S_0$$

$$h(t) = -4.9t^2 + 50t + 3$$

$$v(t) = -9.8t + 50$$

$$a(t) = -9.8$$

How high will the tiger go?

$$0 = -9.8t + 50$$
$$9.8t = 50$$
$$t = 5.102 \text{ sec}$$
$$h(5.102) = -4.9(5.102)^2 + 50(5.102) + 3$$
$$= 130.55 \text{ m}$$

When will he be 67m above the ground?

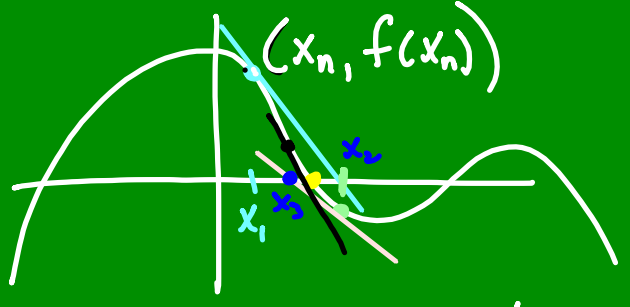
$$67 = -4.9t^2 + 50t + 3$$
$$0 = -4.9t^2 + 50t - 64$$
$$t = \frac{-50 \pm \sqrt{50^2 - 4(-4.9)(-64)}}{2(-4.9)}$$
$$t = 1.5 \text{ sec} \quad 8.7 \text{ sec}$$

How fast is he moving at 67 m?

$$v(1.5) = -9.8(1.5) + 50 = 35.3 \text{ m/s}$$
$$v(8.7) = -9.8(8.7) + 50 = -35.3 \text{ m/s}$$

Newton's Method

$f(x) = x^3 - 3x - 1$



$m = f'(x_n)$

$y - f(x_n) = f'(x_n)(x - x_n)$

$0 - f(x_n) = f'(x_n)(x - x_n)$

$\frac{-f(x_n)}{f'(x_n)} = x - x_n$

$$x_n - \frac{f(x_n)}{f'(x_n)} = x$$

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$y = \frac{1}{x}$

$y = 4 - x^2$

$\frac{1}{x} = 4 - x^2$

$0 = 4 - x^2 - \frac{1}{x}$

$f(x) = x^3 + x - 1 \quad [-4, 1]$

$x = x - \frac{x^3 + x - 1}{3x^2 + 1}$

$x_1: \; x - \frac{x^3 + x - 1}{3x^2 + 1} \quad x = 0$