37. $4\sin\theta - 1\theta$

$+4\cos\theta - 1$

52. $\frac{2}{x^{11/3}} + 3\cos x$

$\sqrt[3]{x^1}$

$2x^{-11/3} + 3\cos x$

$-\frac{2}{3}x^{-4/3} - 3\sin x$

24. $\frac{5}{(2x)^3} + 2\cos x$

$\frac{5}{8x^3} + 2\cos x$

$\frac{5}{8}x^{-3} + 2\cos x$

$\frac{-15}{8}x^{-4} - 2\sin x$

2.3 Rules

A. Position

where you Start

$$s(t) = -16t^2 + v_0 t + s_0 \quad \text{English}$$

$$s(t) = -4.9t^2 + v_0 t + s_0 \quad \text{Metric}$$

Velocity

Average Velocity $\frac{60-0}{1-0}$

Avg. first 15 minutes

x	y
0	0
15	19
30	40
60	60

$\frac{40-19}{30-15}$

Instantaneous Velocity

Derivative

Ex. Suppose a ball 128 ft off the ground is thrown into the air at 32 ft/sec

1. $s(t) = -16t^2 + 32t + 128$

When does it hit?

$0 = -16t^2 + 32t + 128$

$\frac{0}{-16} = \frac{-16(t^2 - 2t - 8)}{-16}$

$= -16(t-4)(t+2)$

$t = 4, \cancel{-2}$

$t - 4 = 0$

$+4 \quad +4$

$t = 4$

$t + 2 = 0$

$-2 \quad -2$

$t = -2$

What is its velocity when it hits?

$t=4$ $s(t)=-16t^2+32t+128$

$v(t)=-32t+32$

$-32(4)+32$

$-128+32$

-96 ft/sec

Avg. Velocity $[2,3]$

$$V_{avg} = \frac{s(3) - s(2)}{3-2} = \frac{80-128}{1} = \frac{-48}{1} \frac{ft}{sec}$$

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