The velocity function is the derivative of the position function.

Ex. 2: At t=0, a diver jumps from a diving board 32 feet above the water.

The position of the diver is given by $s(t)=-16t^2+16t+32$,

where s is measured in feet and t in seconds.

a. When does the diver hit the water?

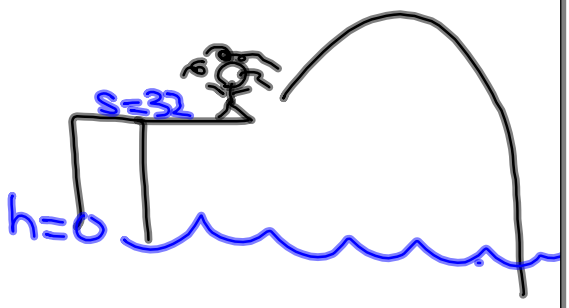
$0=-16t^2+16t+32$

$0=t^2-t-2$

$0=(t-2)(t+1)$

$t=2$ $t=-1$

2 seconds



b. What is the diver's velocity at impact?

$s'(t)=-32t+16$

$s'(2)=-32(2)+16=-48$ ft/sec

The position of a free-falling object under the pressure of gravity is:

$$s(t) = \frac{1}{2}gt^2 + v_0 t + s_0$$

s_0 = initial height

v_0 = initial velocity

g = acceleration due to gravity

$-9.8\ m/s^2$

$-32\ ft/sec^2$

Ex. 3: A projectile is shot upward with an initial velocity of 120 meters per second. What is the velocity after 5 seconds? Use the position function $s(t)=-4.9t^2 + v_o t + s_o$.

$s(t) = -4.9t^2 + 120t$

$s'(t) = -9.8t + 120$

$s'(5) = -9.8(5) + 120 = 71 \text{ m/sec}$