Assignment #7 Graded

10. Find line tangent to the curve $s = -16t^2 + 64t$ at point (3, 48).

With my TI-83 I plugged the equation $s = -16t^2 + 64t$ into the y equals function. Then, I viewed the graph. With the trace function I identified the point (3, 48) and then used the draw button to access the tangent line function. The tangent line equation that was given to me by the calculator was $y = -31.319X + 141.9646$.

$s(t) = -16t^2 + 64t \qquad s(t+h) = -16(t+h)^2 + 64(t+h)$

$$\lim_{h \to 0} \frac{[-16(t+h)^2 + 64(t+h)] - [-16t^2 + 64t]}{h}$$

$$\lim_{h \to 0} \frac{-16(t^2 + 2th + h^2) + 64t + 64h + 16t^2 - 64t}{h}$$

$$\lim_{h \to 0} \frac{-16t^2 - 32th - 16h^2 + 64t + 64h + 16t^2 - 64t}{h}$$

$$\lim_{h \to 0} -32t - 16h + 64 \qquad \text{as } h \to 0 \text{ } -16h \text{ vanishes}$$

$-32t + 64$

$\boxed{m = -32}$

$48 = -32(3) + b$

$48 = -96 + b$

$144 = b$

$\boxed{y = -32x + 144}$

The equation for the line tangent to the curve $s = -16t^2 + 64t$ is $y = -32x + 144$. This is supported by the calculator equation b/c they are very close. The calculator's equation of the tangent line is an estimate.