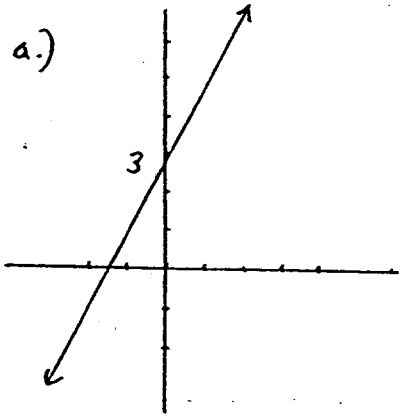
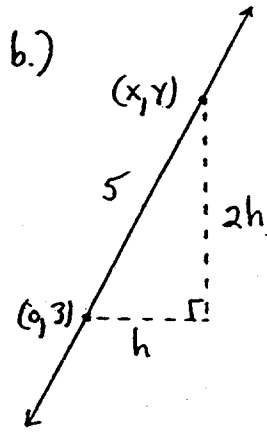
ESP
Kouba
Worksheet 12 Solutions

1.) $Y = 2X \cdot \cos 3X \Rightarrow Y' = 2X \cdot -\sin 3X \cdot 3 + 2 \cdot \cos 3X$ and
$X = \frac{\pi}{2}$, $Y = 2 \cdot \frac{\pi}{2} \cdot \cos \frac{3\pi}{2} = \pi \cdot 0 = 0$, $Y' = -6 \cdot \frac{\pi}{2} \cdot \sin \frac{3\pi}{2} + 2 \cdot \cos \frac{3\pi}{2} = 3\pi \Rightarrow$
tangent line is $Y - 0 = 3\pi \left(X - \frac{\pi}{2}\right)$.

2.) a.)



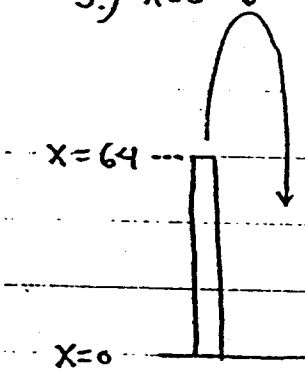
b.)



$h^2 + (2h)^2 = 5^2 \rightarrow$
$5h^2 = 25 \rightarrow$
$h = \sqrt{5}$ so
points (x,y) are

$(0 \pm \sqrt{5}, 3 \pm 2\sqrt{5})$ or $(\sqrt{5}, 3 + 2\sqrt{5})$ and $(-\sqrt{5}, 3 - 2\sqrt{5})$.

3.) $x' = 0 \rightarrow$



acc.: $x''(t) = -32$ ft./sec^2.
vel.: $x'(t) = -32t + c$ and $x'(0) = 48$ ft./sec.
$\rightarrow 48 = -32(0) + c \rightarrow c = 48$ so
$\boxed{x'(t) = -32t + 48}$
pos.: $x(t) = -16t^2 + 48t + c$ and $x(0) = 64$ ft.
$\rightarrow 64 = -16(0) + 48(0) + c \rightarrow c = 64$ so
$\boxed{x(t) = -16t^2 + 48t + 64}$;

a.) $x'(t) = 0 \rightarrow -32t + 48 = 0 \rightarrow t = \frac{48}{32} = \frac{3}{2}$ sec.

b.) $x\left(\frac{3}{2}\right) = -16\left(\frac{3}{2}\right)^2 + 48\left(\frac{3}{2}\right) + 64 = 100$ ft.

c.) $x(t) = 0 \rightarrow -16t^2 + 48t + 64 = 0 \rightarrow$
$-16(t^2 - 3t - 4) = -16(t-4)(t+1) = 0 \rightarrow t = 4$ sec.