real-world-physics-problems.com
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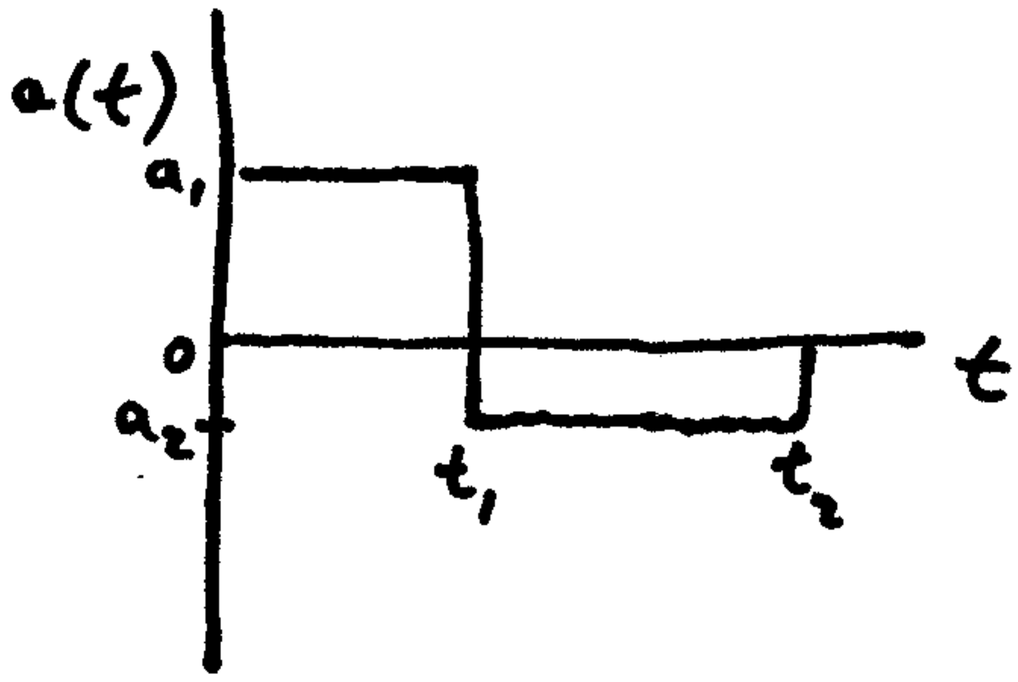
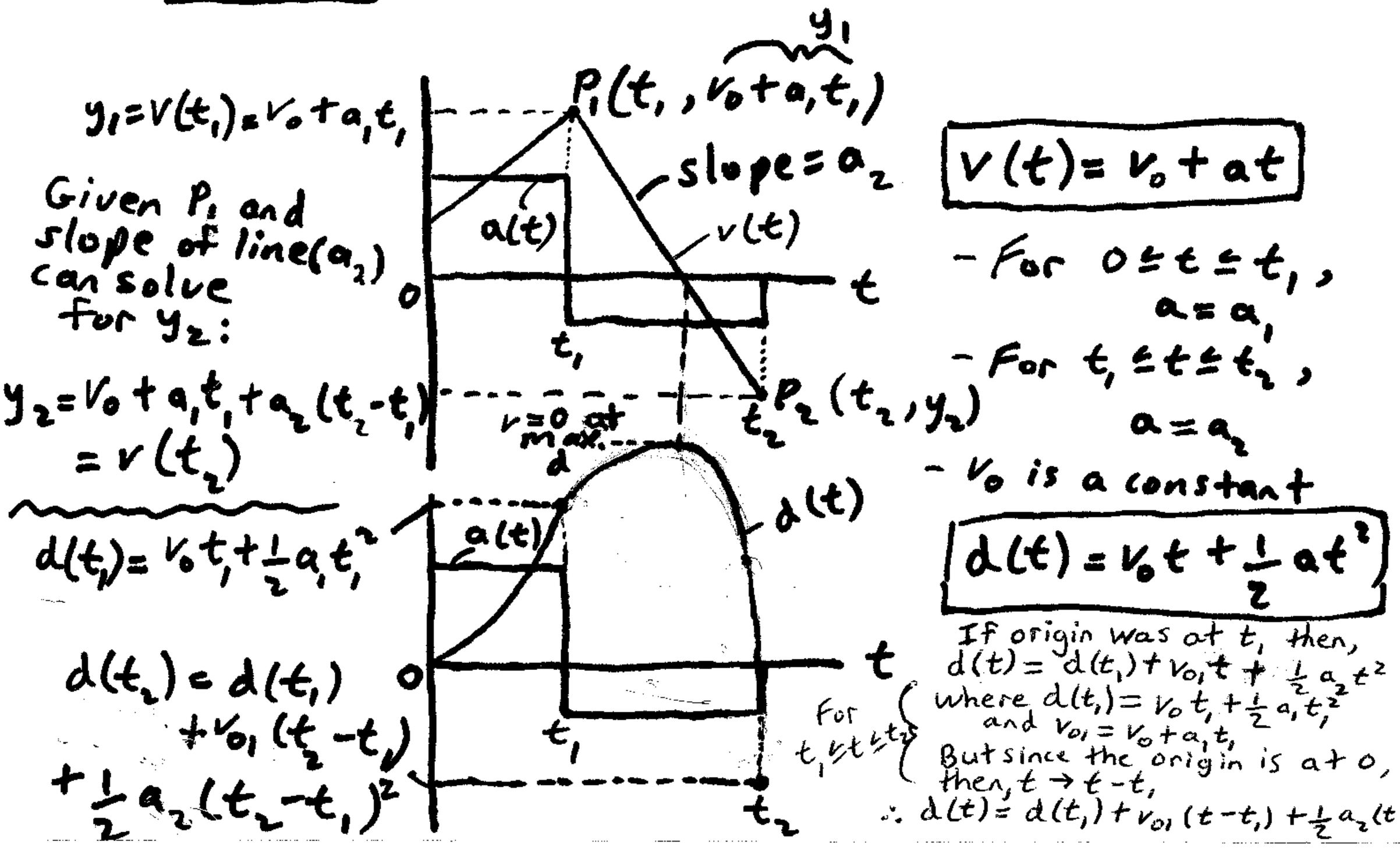
This is a problem involving constant acceleration.

Given the following graph of $a(t)$, sketch the graph of $v(t)$ and $d(t)$.



Solution:



$y_1 = v(t_1) = v_0 + a_1 t_1$

Given P_1 and slope of line (a_2) can solve for y_2:

$y_2 = v_0 + a_1 t_1 + a_2 (t_2 - t_1)$
$= v(t_2)$

$d(t_1) = v_0 t_1 + \frac{1}{2} a_1 t_1^2$

$d(t_2) = d(t_1) + v_{01}(t_2 - t_1) + \frac{1}{2} a_2 (t_2 - t_1)^2$

$$\boxed{v(t) = v_0 + at}$$

- For $0 \le t \le t_1$, $a = a_1$
- For $t_1 \le t \le t_2$, $a = a_2$
- v_0 is a constant

$$\boxed{d(t) = v_0 t + \frac{1}{2} a t^2}$$

For $t_1 \le t \le t_2$:

If origin was at t_1, then,
$d(t) = d(t_1) + v_{01} t + \frac{1}{2} a_2 t^2$
where $d(t_1) = v_0 t_1 + \frac{1}{2} a_1 t_1^2$
and $v_{01} = v_0 + a_1 t_1$
But since the origin is at 0, then, $t \to t - t_1$,
$\therefore d(t) = d(t_1) + v_{01}(t - t_1) + \frac{1}{2} a_2 (t - t_1)^2$