

東大文科 1963前期 (5)

$$vt_0 \cos \alpha = 10 \quad \text{--- (1)}$$

$$vt_0 \sin \alpha - 5t_0^2 = 0 \quad \text{--- (2)}$$

$$f'(t) = v \cos \alpha$$

$$g'(t) = v \sin \alpha - 10t$$

$$\{f'(t)\}^2 + \{g'(t)\}^2 = v^2 \cos^2 \alpha + v^2 \sin^2 \alpha - 20v \sin \alpha \cdot t + 100t^2 = v^2 - 20v \sin \alpha \cdot t + 100t^2$$

$$\{f'(t_0)\}^2 + \{g'(t_0)\}^2 = v^2 - 20v \sin \alpha \cdot t_0 + 100t_0^2 = v^2 - (vt_0 \sin \alpha - 5t_0^2) \cdot 20 = v^2$$

② #1

① #1, $v > 0, 0 < \alpha < \frac{\pi}{2}$ #1 $t_0 = \frac{10}{v \cos \alpha}$

② #1 $t_0 \neq 0$ #1 $v \sin \alpha = 5t_0, v \sin \alpha = \frac{50}{v \cos \alpha}, v^2 = \frac{50}{\frac{1}{2} \sin 2\alpha \cos \alpha} = \frac{100}{\sin 2\alpha}$

∴ $\{f'(t_0)\}^2 + \{g'(t_0)\}^2 = \frac{100}{\sin 2\alpha}$

∴ $\sin 2\alpha$ が最大なとき 最小値 (なり) ∴ $\alpha = \frac{\pi}{4}$