① Jarak = 154 km = dx = Δx

T tiba = 02.00

T berangkat = 00.00

dt = Δt = T tiba − T berangkat = 02.00 − 00.00 = 2 jam

Maka kecepatan : $v = \frac{dx}{dt} = \frac{\Delta x}{\Delta t} = \frac{154}{2} = 77$ km/jam //

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③ $y = x^2 - 2x$

jika $dx = 0.01$, dan $x = 1$ → maka : $y + dy = (x+dx)^2 - 2(x+dx)$

$y + dy = (1+0.01)^2 - 2(1+0.01)$

$y + dy = (1.01)^2 - 2.02$

$y + dy = -0.999$ ⇒ y di $x = 1$: $x^2 - 2x = 1^2 - 2(1) = -1$

Sehingga : $dy = -0.999 - y$

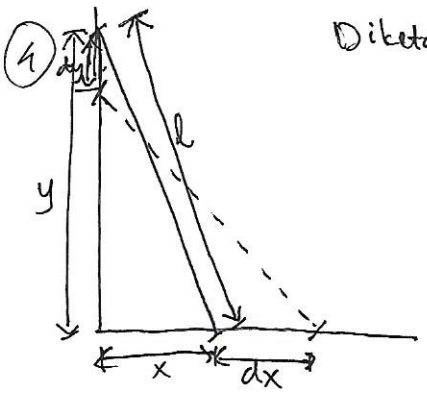
$dy = -0.999 - (-1)$

$dy = 0.0001$

$\frac{dy}{dx} = \frac{0.0001}{0.01}$

$\frac{dy}{dx} = 0.01$

④



Diketahui: panjang tangga, $l = 25$ m

jarak tangga-tembok, $x = 7$ m

jarak lantai-tangga, $y = 24$ m

pergeseran tangga, $dx = 0.05$ m

hubungan awal : $x^2 + y^2 = l^2$ → maka : $(x+dx)^2 + (y+dy)^2 = l^2$

$(7+0.05)^2 + (24-dy)^2 = 25^2$

$49.7025 + (24-dy)^2 = 625$

$(24-dy)^2 = 575.2975$

$24 - dy = \sqrt{575.2975}$

$dy = 24 - 23.9854$

$dy = 0.0146$ m //

⑤ $y = x + 4$ → $\frac{dy}{dx} = 1$

⑥ $y = x^2$ → $\frac{dy}{dx} = 2x$

⑦ $y = 2x^2 + 3$ → $\frac{dy}{dx} = 4x$

⑧ $y = x^2 + 5x + 6$ → $\frac{dy}{dx} = 2x + 5$

⑨ $y = 5x^2 - 7x + 1$ → $\frac{dy}{dx} = 10x - 7$

⑩ $y = -x^2 + 4$ → $\frac{dy}{dx} = -2x$

⑪ $y = -5x^4$ → $\frac{dy}{dx} = -20x^3$

⑫ $y = 4x^3 - x^6$

$\frac{dy}{dx} = \frac{d}{dx}[u-v] = \frac{du}{dx} - \frac{dv}{dx}$

$= 12x^2 - 6x^5$

⑬ $y = (x^2 + 4x - 2)(3x - 1)$

$\frac{dy}{dx} = \frac{d}{dx}[u.v] = \frac{du}{dx}.v + \frac{dv}{dx}.u$

dimana $u = x^2 + 4x - 2$ dan $v = 3x$

Sehingga

$\frac{dy}{dx} = \frac{d}{dx}(x^2+4x-2)(3x-1) + \frac{d}{dx}(3x-1)(x^2+4x$

$\frac{dy}{dx} = (2x+4)(3x-1) + 3(x^2+4x-2)$ //

(14) $y = \frac{4x-3}{x^2+9}$ mis. : $u = 4x-3$, $v = x^2+9$

$$\frac{dy}{dx} = \frac{d}{dx}\left[\frac{u}{v}\right] = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2} = \frac{(x^2+9)\frac{d}{dx}(4x-3) - (4x-3)\cdot\frac{d}{dx}(x^2+9)}{(x^2+9)^2} = \frac{4(x^2+9) - (4x-3)(2x)}{(x^2+9)^2}$$

(15) $y = 4x+5$

$y' = dy/dx$

Saat $x=0$, $y' = \frac{dy}{dx} = \frac{d}{dx}(4x+5) = 4$ // → y' fungsi konstan di semua $x \in \mathbb{R}$

(16) $y = -10x+24$

$\frac{dy}{dx} = -10$ ⇝ $\frac{dy}{dx}$ adalah fungsi konstan $= -10$ di semua $x \in \mathbb{R}$

(17) $y = x^2+3$

$\frac{dy}{dx} = 2x \rightarrow \frac{dy(3)}{dx} = 2(3) = 6$

(18) $y = 3x^2 - 12$

$\frac{dy}{dx} = 6x \rightarrow \frac{dy(10)}{dx} \Rightarrow 6(10) = 60$

(19) $y = x^4 + 3x^2 - 5x$

$y' = \frac{dy}{dx} = 4x^3 + 6x - 5$

Saat $x=3 \rightarrow y'(3) = 4(3)^3 + 6(3) - 5 = 121$ //

(20) $y = (2x-5)(5x-2) \Rightarrow \frac{dy}{dx} = \frac{d}{dx}[u.v] = uv' + vu'$, dimana $u = (2x-5)$, $v = 5x-2$

$$\frac{dy}{dx} = (2x-5)\cdot\frac{d}{dx}(5x-2) + (5x-2)\frac{d}{dx}(2x-5)$$

$$\frac{dy}{dx} = 5(2x-5) + 2(5x-2)$$

$$\frac{dy}{dx} = 10x - 25 + 10x - 4 = 20x - 29.$$

Saat $x=1 \rightarrow \frac{dy(1)}{dx} = 20(1) - 29 = -9$ //