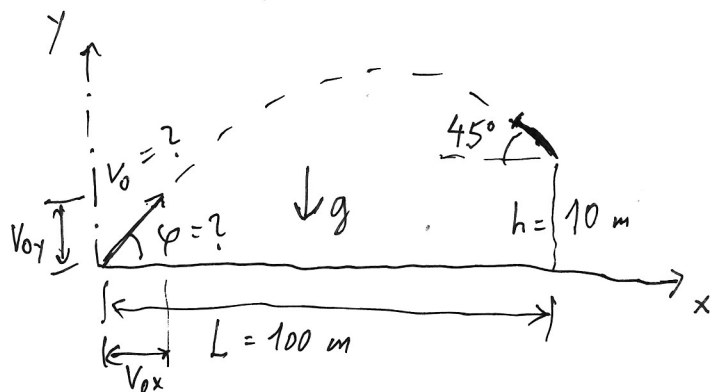Úl. 2. 13. (zjednodušené)

$x = v_0 t \cos\varphi$

$$y = v_0 t \sin\varphi - \frac{1}{2} g t^2$$

$v_x = v_0 \cos\varphi$

$v_y = v_0 \sin\varphi - g t$

$100 = v_0 t \cos\varphi$

$10 = v_0 t \sin\varphi - \frac{1}{2} g t^2$

~~$v_x = v_y$~~

~~$v_0 \cos\varphi = v_0 \sin\varphi - g t$~~

~~$100^2 = v_0^2 t^2 \cos^2\varphi$~~

~~$\left(10 + \frac{1}{2} g t^2\right)^2 = v_0^2 t^2 \sin^2\varphi$~~

~~$100^2 + 10^2 + 10 g t^2 + \frac{1}{4} g^2 t^4 = v_0^2 t^2$~~

~~$10100 + \left(10 g - v_0^2\right) t^2 + \frac{1}{4} g^2 t^4 = 0$~~

$L = v_{0x} t$

$\underline{h = v_{0y} t - \frac{1}{2} g t^2}$

$v_x = -v_y$

$v_{0x} = g t - v_{0y}$

$L = (g t - v_{0y}) t = g t^2 - v_{0y} t$

$v_{0y} = \frac{1}{t}(g t^2 - L) = g t - \frac{L}{t}$

$h = \left(g t - \frac{L}{t}\right) t - \frac{1}{2} g t^2 = g t^2 - \frac{1}{2} g t^2 - L$

$= \frac{1}{2} g t^2 - L$

$t^2 = \frac{2}{g}(h + L)$ \qquad $t = \sqrt{\frac{2}{g}(h+L)} = 4,7356 \text{ s}$

$v_{0x} = \frac{L}{t} = \frac{L}{\sqrt{\frac{2}{g}(h+L)}} = 21,1166$

$v_{0y} = g\sqrt{\frac{2}{g}(h+L)} - \frac{L}{\sqrt{\frac{2}{g}(h+L)}} = 25,34$

$v_{0x} = v_0 \cos\varphi$

$v_{0y} = v_0 \sin\varphi$

$v_0 = \sqrt{v_{0x}^2 + v_{0y}^2} \doteq 33 \text{ m/s}$

$\operatorname{tg}\varphi = \frac{v_{0y}}{v_{0x}}$

$\varphi = 50,2°$