6 (1)
$$x = v_0 t + \frac{1}{2} a t^2$$
$$0 = 4.0 v_0 + \frac{1}{2}(-9.8) \cdot 4.0^2 \quad (\text{鉛直上向: } +)$$
$$v_0 = \frac{1}{2} \cdot 9.8 \cdot 4.0 = 19.6$$
$$\fallingdotseq \boxed{20 \text{ m/s}}$$

(2)
$$v = v_0 + at$$
$$0 = 19.6 - 9.8 t$$
$$t = \boxed{2.0 \text{ s}}$$

(3)
$$x = v_0 t + \frac{1}{2} a t^2$$
$$= 19.6 \cdot 2.0 + \frac{1}{2}(-9.8) 2.0^2$$
$$= 19.6 \fallingdotseq \boxed{20 \text{ m}}$$

(4)
$$x = v_0 t + \frac{1}{2} a t^2$$
$$14.7 = 19.6 t + \frac{1}{2}(-9.8) t^2$$
$$4.9 t^2 - 19.6 t + 14.7 = 0$$
$$t^2 - 4t + 3 = 0$$
$$(t-1)(t-3) = 0$$
$$t = 1.0 s, \boxed{3.0 s}$$

7 (1)
$$y = v_{0y} t + \frac{1}{2} a_y t^2 \quad (\text{鉛直下向: } +)$$
$$19.6 = 0 + \frac{1}{2} \cdot 9.8 \cdot t^2$$
$$t^2 = 19.6 / 4.9 = 4$$
$$t = \boxed{2.0 \text{ s}}$$

(2)
$$L = v_{0x} t + \frac{1}{2} a_x t^2$$
$$= 14.7 \cdot 2.0 + 0$$
$$= 29.4 \fallingdotseq \boxed{29 \text{ m}}$$

(3)
$$v_x = v_{0x} + a_x t$$
$$= 14.7 + 0$$
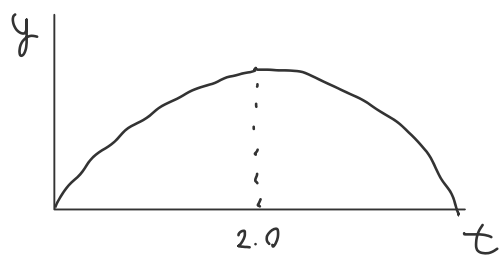$$= 14.7 \text{ m}$$
$$v_y = v_{0y} + a_y t \quad (\text{鉛直下向: } +)$$
$$= 0 + 9.8 \cdot 2.0$$
$$= 19.6$$
$$v = \sqrt{14.7^2 + 19.6^2}$$
$$= 24.5 \fallingdotseq \boxed{25 \text{ m/s}}$$

8 (1)

$$t = \boxed{4.0 \text{ s}}$$

(2) 4.0s 後に x 58.8m より
$$x = v_{0x} t + \frac{1}{2} a_x t^2$$
$$58.8 = v_{0x} \cdot 4.0 + 0$$
$$v_{0x} = 58.8 / 4.0 = 14.7 \fallingdotseq \boxed{15 \text{ m/s}}$$

2.0s 後に vertex より
$$v_y = v_{0y} + a_y t$$
$$0 = v_{0y} - 9.8 \cdot 2.0 \quad (\text{鉛直上向: } +)$$
$$v_{0y} = 19.6 \fallingdotseq \boxed{20 \text{ m/s}}$$

(3)
$$\tan\theta = 19.6 / 14.7 = 4/3$$
$$= 1.33 \cdots \fallingdotseq \boxed{1.3}$$