

$$g(x) = \int_0^x f(t) dt$$

$$\Rightarrow \boxed{g(2) = \int_0^2 f(t) dt} \quad \text{--- (i)}$$

Given

$$\frac{1}{2} \leq f(t) \leq 1 \quad \text{for } t \in (0, 1]$$

$$\Rightarrow \int_0^1 \frac{1}{2} dt \leq \int_0^1 f(t) dt \leq \int_0^1 1 dt$$

$$\Rightarrow \boxed{\frac{1}{2} \leq \int_0^1 f(t) dt \leq 1} \quad \text{--- (i)}$$

Now

$$0 \leq f(t) \leq \frac{1}{2} \quad t \in [1, 2]$$

$$\int_1^2 0 dt \leq \int_1^2 f(t) dt \leq \int_1^2 \frac{1}{2} dt$$

$$\boxed{0 \leq \int_1^2 f(t) dt \leq \frac{1}{2}} \quad \text{--- (ii)}$$

add (i) & (ii)

$$0 + \frac{1}{2} \leq \int_0^1 f(t) dt + \int_1^2 f(t) dt \leq 1 + \frac{1}{2}$$

$$\frac{1}{2} \leq \int_0^2 f(t) dt \leq \frac{3}{2}$$

$$\boxed{\frac{1}{2} \leq g(2) \leq \frac{3}{2}}$$

[from ~~(*)~~]

or $\boxed{0.5 \leq g(2) \leq 1.5}$

□