

$\frac{2.67}{4}$

(I)

$$\int_0^{\frac{\pi}{4}} \frac{1+g^2x}{1+g^2x} dx = \int_0^{\frac{\pi}{4}} \frac{1+g^2x}{2g^2x} = \frac{1}{2} \int_0^{\frac{\pi}{4}} \frac{1}{g^2x} dx = \frac{1}{2} \int_0^{\frac{\pi}{4}} \frac{1}{x} dx = \frac{1}{2} \ln|x| \Big|_0^{\frac{\pi}{4}} + \frac{1}{2} x \Big|_0^{\frac{\pi}{4}} =$$

$$\frac{1}{2} + \frac{\pi}{8}$$