$$F(x) = 8 + e^{(-x)} \sin(x)$$

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!}$$

$$e^{-x} = 1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \frac{x^5}{5!}$$

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!}$$

$$\frac{3x^3}{6} \quad \frac{x^3}{6}$$

$$\frac{5x^5}{120} + \frac{x^5}{120}$$

$$\frac{2x^3}{6} \quad \frac{x^3}{3}$$

$$\frac{x^5}{20}$$

$$= 8 + \left(x - \frac{x^3}{3!} + \frac{x^5}{5!}\right)\left(1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \frac{x^5}{5!}\right)$$

$$8 + x - x^2 + \frac{x^3}{2} - \frac{x^4}{6} + \frac{x^5}{24} - \frac{x^5}{120} - x^3 \cdots$$

$$= 8 - x^2 + \frac{x^3}{2} - \frac{x^4}{6} + \frac{x^5}{24} - \frac{x^6}{120}$$
$$-\frac{x^3}{6} + \frac{x^4}{6} - \frac{x^5}{12} - \frac{x^6}{36}$$
$$\frac{x^5}{120} - \frac{x^6}{120}$$

$$= 8 + x - x^2 + \frac{x^3}{2} - \frac{x^3}{6} - \frac{x^4}{6} + \frac{x^4}{6} + \frac{x^5}{24} - \frac{x^5}{12} + \frac{x^5}{120}$$

$$\boxed{= 8 + x - x^2 + \frac{x^3}{3} - \frac{x^5}{30}}$$