

Exercise 9

In Exercises 6 through 11, use the formal method, involving an infinite series of residues and illustrated in Examples 2 and 3 in Sec. 89, to find the function $f(t)$ that corresponds to the given function $F(s)$.

$$F(s) = \frac{\sinh(xs^{1/2})}{s^2 \sinh(s^{1/2})} \quad (0 < x < 1).$$

$$\text{Ans. } f(t) = \frac{1}{6}x(x^2 - 1) + xt + \frac{2}{\pi^3} \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^3} e^{-n^2\pi^2 t} \sin n\pi x.$$