

HOMEWORK #9 (Chapter 15 Integral Transform Method)

In problem 1, find the Fourier integral representation of the given function.

$$(1) f(x) = \begin{cases} 0, & x < \pi \\ 4, & \pi < x < 2\pi \\ 0, & x > 2\pi \end{cases} \quad (\text{Exercises 15.3 problem 2})$$

In problem 2, represent the given function by an appropriate cosine or sine integral.

$$(2) f(x) = \begin{cases} 0, & |x| < 1 \\ \pi, & 1 < |x| < 2 \\ 0, & |x| > 2 \end{cases} \quad (\text{Exercises 15.3 problem 8})$$

In problem 2, find the cosine and sine integral representations of the given function.

$$(3) f(x) = e^{-x} - e^{-3x}, \quad x > 0 \quad (\text{Exercises 15.3 problem 14})$$

(4) Use the complex form (15) to find the Fourier integral representation of  $f(x) = e^{-|x|}$ .

Show that the result is the same as that obtained from (2). (Exercises 15.3 problem 20).