Eng T 502 · Advanced Applied Engineering Mathematics I

Final Exam (Part I)

Instructors: Reinhard O.W. Franz, Vladimir Solovjov, [e]

Name: _____ Section: 1

1. (a) Find the Fourier integral of the function

$$f(t) = \begin{cases} \sin t & |t| \le \pi \\ 0 & |t| \ge \pi \end{cases}$$

   (b) Establish the following integral formula using the result from the previous integral expansison:

$$\int_0^\infty \frac{\sin^2 \pi\omega}{1-\omega^2}\, d\omega = 0$$

2. Show that

$$\int_{-\infty}^{\infty} \frac{\sin z}{z} \frac{\sin(\omega - z)}{\omega - z}\, dx = \frac{2\pi \sin \omega}{\omega}$$