Dr. Z.'s Calc5 Homework assignment 20

1. Find the Fourier integral representation of

$$f(x)=\begin{cases}0, & \text{if } x<-1;\\ -1, & \text{if } -1\le x<0;\\ 2, & \text{if } 0\le x\le 1;\\ 0, & \text{if } x>1;\end{cases}$$

2. Find the Fourier integral representation of

$$f(x)=\begin{cases}0, & \text{if } x<0;\\ x, & \text{if } 0\le x\le 2;\\ 0, & \text{if } x>2;\end{cases}$$

3. Find the Fourier integral representation of

$$f(x)=\begin{cases}0, & \text{if } x<0;\\ x^2, & \text{if } 0\le x\le 1;\\ 0, & \text{if } x>1;\end{cases}$$

4. Find the Fourier integral representation of

$$f(x)=\begin{cases}0, & \text{if } x<0;\\ e^{-x}, & \text{if } x\ge 0;\end{cases}$$

5. Find the cosine and sine integral representation of the function $f(x)=x^2e^{-x}\ ,\ x>0$.

Hint: According to Maple

$$\int_0^\infty x^2e^{-x}\cos ax=\frac{2(1-3a^2)}{(1+a^2)^3}\quad ,$$

$$\int_0^\infty x^2e^{-x}\sin ax=\frac{2(3-a^2)a}{(1+a^2)^3}\quad ,$$

6. Find the cosine and sine integral representation of the function $f(x)=e^{-2x}\ ,\ x>0$.