**AM375a. Problem set 11. Instructor: Dr. Karttunen.**

Write out *all* the steps in your calculations.

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**Problem 1.** (15.1.1) a) Show that

$$\text{erf}(\sqrt{t}) = \frac{1}{\sqrt{\pi}} \int_0^t \frac{e^{-\tau}}{\sqrt{\tau}} d\tau$$

b) Use the convolution theorem and the results of Problems 39 and 40 in Exercises 4.1 to show that

$$\mathcal{L}\{\text{erf}(\sqrt{t})\} = \frac{1}{s\sqrt{s+1}}$$

**Problem 2.** (15.3.11)
Find the Fourier integral representation of

$$f(x) = e^{-|x|} \sin x$$

**Problem 3.** (15.3.17)
Solve the integral equation (for $f(x)$):

$$\int_0^\infty f(x) \cos(\alpha x) dx = e^{-\alpha}$$

**Problem 4.**
Problem 15.4.4 in Zill and Cullen

**Problem 5.**
Write your own code using your favorite programming language or use Matlab/Maple/Mathematica/SciLab or any other package to generate functions a) $\sin(x)$, b) $\sin(1.2x) + \cos(x./3)$ c) $\sin(1.2x) + \cos(x./3) + \cos(\sqrt{2}x)$. Plot the power spectra of these functions and interpret your data.

**Problem 6.**
Problem 15.5.19 in Zill and Cullen.