Math 514 (092)
Final
Due: Sunday Jun 13

1. Use Watson's lemma to obtain an asymptotic expansion of

$$f(x) = \int_{-\infty}^{\infty} e^{-x\cosh t}\, dt \;.$$

2. Use integration by parts to find an asymptotic expansion for large x of

$$f(x) = \int_{1}^{\infty} \frac{e^{-xt}}{t^2}\, dt$$

   and prove that the expansion is asymptotic.

3. Use the <u>inversion formula</u> to find $\mathscr{L}^{-1}\left\{\dfrac{\cos s}{s}\right\}$.

4. Use <u>Fourier sine transform</u> to solve

$$u_{xx} + u_{yy} = 0, \qquad -\infty < x < \infty, \quad y > 0,$$
$$u(x,0) = e^{-x}, \qquad -\infty < x < \infty.$$