Lecture 3 Homework

1) Find the product of \( z_1 = 4 - 2i \) and \( z_2 = 4 + 2i \).

2) Express the number \( z = 4i \) in polar form.

3) Show that \( f(z) = e^{\bar{z}} \) (the exponent is the conjugate of \( z \)) is nowhere analytic.

4) Show using the definition of the inverse Fourier transform that \( I \) is the inverse transform of \( 2\pi\delta(x) \).

5) Find the Fourier transform of \( sgn(x) \) using the definition (i.e. by integration).

6) Find the Laplace transform of \( \cos^2(t) \). Hint: First use a half-angle formula, then apply given rules.

7) Find the inverse Laplace transform of \( \frac{4}{(s+1)(s+2)} \). Hint: First write this as a product of transforms.

8) Find the inverse Laplace transform of \( \frac{1}{(s+1)^2} \). Hint: First write this as a derivative of another transform.