# Hwmk 18

## Math 528 Summer Session 1

## Due 6/21 (Monday at 11:59 pm)

## 1 Look Ma, No Tables!

Find the Fourier Transform using the integral (no table)

(a) 3 points

$$f(x) = \begin{cases} e^{2ix} & \text{if } -1 < t < 1 \\ 0 & \text{otherwise} \end{cases}$$

(b) 3 points

$$f(x) = \begin{cases} xe^{-x} & \text{if } -1 < t < 0 \\ 0 & \text{otherwise} \end{cases}$$

## 2 Big Waves My Dude

Suppose you have the PDE: $\frac{\partial^2 u(x,t)}{\partial t^2} = \frac{\partial^2 u(x,t)}{\partial x^2}$ with $-\infty < x < \infty$, $0 < t < \infty$ and assume $u(x,t)$ decays to 0 at $x = -\infty$ and $x = \infty$. This classic PDE is called the wave equation!

(a) 4 points Take the Fourier transform of the PDE (Hint: Your resulting equation will be an ODE with no $x$ and only $t$, $w$ and $\hat{u}(w,t)$).