1. Determine the solution to the heat equation $u_t = \alpha^2 u_{xx}$ with $\alpha \neq 1$ (We did the $\alpha = 1$ case in class).

2. Use Fourier Transforms to determine the solution to $u_t = cu_x$ is $u(x,t) = f(x+ct)$ where $u(x,0) = f(x)$.

3. Determine d'Alembert's solution for $u_{tt} = c^2 u_{xx}$

4. Derive d'Alembert's formula for $u_{tt} = u_{xx}$ by assuming that $u(x,t) = v(x+t, x-t) = v(y,z)$. Next show that the wave equation yields $v_{yz} = 0$ and hence $v = A(y) + B(z)$ and solve for A and B using the initial conditions $u(x,0) = f(x)$ and $u_t(x,0) = g(x)$.