PRACTICE PROBLEMS FOR THE SECOND MIDTERM

1. (a) Give the definition of
   (i) The Heaviside step function.
   (ii) The error function.
   (iii) an odd function $f(x)$.
   (iv) an even function $f(x)$.

   (b) Write down
   (i) The kinetic energy of an infinite piece of string with density ρ and tension T.
   (ii) The potential energy of an infinite piece of string with density ρ and tension T.
   (iii) The total energy of an infinite piece of string with density ρ and tension T.
   (iv) D'Alembert's solution to the wave equation with initial conditions.
   (v) The general solution to the diffusion equation with initial condition $u(x,0) = \phi(x)$.

   (c) State
   (i) the weak maximum principle, for the diffusion equation.
   (ii) the strong maximum principle, for the diffusion equation.

2. 2.1.7.
3. 2.1.10.
4. 2.2.2.
5. 2.3.1
6. 2.3.6.
7. 2.4.15.