Math 5102 **Homework 5**
due Mon **April 1**, 2019

1. Find the Green's function for the Bessel operators

a) $Lu = -\dfrac{d}{dx}x\dfrac{du}{dx}$

b) $Lu = -\dfrac{d}{dx}x\dfrac{du}{dx} + \dfrac{n^2}{x}\,u$

with the boundary conditions $u(0)$ finite and $u(1) = 0$.

2. a) Find the Green's function for the problem

$$L = -\frac{d^2}{dx^2} + \omega^2, \quad u(a) = 0,\ u(b) = 0$$

for $a < b$ and ω a constat.

b) Does this Green's function exist for all values of ω? If not, then what are the exceptional values for ω?

3. Find (as an integral) the solution to the boundary value problem

$$u'' + 3u' = f, \quad u(0) = 1,\ u'(1) = 6$$

4. Find the Green's function for the problem

$$u''' = f, \quad u(0) = 0,\ u''(0) = 0,\ u'(1) = 0$$