Practice Quiz Three

Solve the following boundary value problems

1: Consider the region of the plane determined by $0 \leq \theta \leq \frac{\pi}{2}$ and $5 \leq r \leq 6$. Solve the heat equation $\Delta u = 0$ subject to boundary conditions

$$u(5, \theta) = 0 \quad u(6, \theta) = g(\theta)$$

and

$$u_\theta(r, 0) = 0 \quad u_\theta(r, \frac{\pi}{2}) = 0.$$

2: Solve the equation $0 = \Delta u + 2$ in the region $0 \leq x \leq 1, 0 \leq y \leq 1$ with homogeneous Dirichlet boundary conditions ($u = 0$ on the boundary of the square). Compare (for yourself) your process with solving $0 = u_{xx} + 2$ in homework two and three. Hint: Use double Fourier series.

3: Solve the equation $0 = \Delta u + 2$ in the region $0 \leq r \leq 1, -\pi \leq \theta \leq \theta$ with homogeneous Dirichlet boundary conditions ($u = 0$ on the boundary of the disc). Compare (for yourself) your process with solving $0 = u_{xx} + 2$ in homework two and three. Hint: Do not use double Fourier series.