Math 333 Homework Problems #8
APPLIED PARTIAL DIFFERENTIAL EQUATIONS (2ND EDITION), by J.D. Logan

4.5.   Diffusion in a disk

- $\boxed{4.5.6}$ Consider the heat equation on the quarter-circle of radius R:

$$u_t = k\Delta u$$
$$u_\theta(r,0,t) = u_\theta(r,\pi/2,t) = u(R,\theta,t) = 0$$
$$u(r,\theta,0) = f(r,\theta).$$

Find the solution, and analyze the temperature as $t \to \infty$.

- $\boxed{4.5.7}$ Consider the wave equation on the half-circle of radius R:

$$u_{tt} = c^2\Delta u$$
$$u(r,0,t) = u_\theta(r,\pi,t) = u(R,\theta,t) = 0$$
$$u(r,\theta,0) = f(r,\theta), \ u_t(r,\theta,0) = 0.$$

Solve the initial value problem.

- $\boxed{4.5.8}$ Consider the forced heat equation on the wedge of radius R:

$$u_t = k\Delta u$$
$$u_\theta(r,0,t) = u(r,\pi/3,t) = 0, \ u(R,\theta,t) = h(\theta)$$
$$u(r,\theta,0) = f(r,\theta).$$

Find the solution, and analyze the temperature as $t \to \infty$.