Homework Problems

- 1, 2, 3 from 6.3
- 1, 6 from 6.4

Practice Problems on 6.3

1. Assume that a function is harmonic in a disk of radius $r = 3$ and at the boundary i.e., at $r = 3$ it becomes $u = 5\cos^2(\theta) + 3$. Find the maximum of $u$ and also its value at $r = 0$.

2. Solve the Laplace equation in the disk $r < a$ with the boundary condition $u(a, \theta) = 3 + 2\cos^2(\theta) + 7\sin(3\theta)$

3. Solve the same problem as 2 but not in the interior: rather at the exterior of the disk $r = a$, demanding that the solution be finite at $r \to \infty$.

4. Solve the Laplace equation on the wedge $0 < r < a$, $0 < \theta < b$ with homogeneous Neumann boundary conditions at $\theta = 0$ and $\theta = b$ and with $u(a, \theta) = 7\cos(\frac{\pi}{2}\theta) + 2$. 