

## BM5063 Systems Medicine

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### Problem Set 7

#### Instructions

1. You are not expected to submit answers to these problems

#### Questions

1. In class, we worked on a one-dimensional model of a tumor. Following the same approach, calculate the nutrient profile inside a spherical tumor by considering its spherical shape. Under isotropic assumptions, the diffusion equation changes to

$$\frac{\partial \rho}{\partial t} = \frac{D}{r^2} \frac{\partial}{\partial r} \left( r^2 \frac{\partial \rho}{\partial r} \right) - \beta \rho$$

Specify the boundary conditions, and sketch the concentration profile for different tumor sizes.

2. Following the one-dimensional model discussed in class, write a Python program to model tumor growth in 3D with the nutrient profile obtained in the last question.

