MAT 1332, Fall 2015, Assignment 4
Due Friday December 4 at 2:00 pm.
Late assignments will not be accepted.

Instructor: Aziz Khanchi

Drop it in the box of 1332, found in Math dept (585 King Edward ave, Ottawa, ON): first floor, on the left wall.

Student Name _____ Student Number _____

QUESTION 1. Consider the following migration model for a city and its suburbs. Each year 5% of the city population moves to the suburbs, and 3% of the suburban population moves to the city.

Write the transition matrix for the annual migration. In the long run, what percentage of the total population would eventually live in city if the transition matrix remains constant over many years?

QUESTION 2. On any given day, a student is either healthy or ill. Of the students who are healthy today, 95% will be healthy tomorrow. Of the students who are ill today, 55% will still be ill tomorrow.

Write the transition matrix for this situation.

Suppose that 20% of the students are ill on Monday. What percentage of the students are likely to be ill on Wednesday?

QUESTION 3. Consider the function $f(x, y) = \ln(x + \sqrt{x^2 + y^2})$. Determine $f_x(3, 4)$ and $f_y(3, 4)$.

QUESTION 4. Find an equation of the tangent plane to the surface

$$z = y\cos(x - y)$$

at $(3, 1, 0)$.

QUESTION 5. Find the particular solution for the initial value problem.

$$\frac{dx_1}{dt} = 3x_1 + 2x_2$$
$$\frac{dx_2}{dt} = 3x_1 + 8x_2$$

with $x_1(0) = 3, x_2(0) = 23$.