

MIDTERM 2

MATH 126 A, B Last name, first name: _____

Section: _____

Student number: _____

Signature: _____

Please do not start working until instructed to do so.

You have 50 minutes.

Please show your work.

Please cross out all the work you do not want the graders to read.

Scientific, but not graphing calculators are OK.

You may use one 8.5 by 11 sheet of handwritten notes.

Problem 1. _____

Problem 2. _____

Problem 3. _____

Problem 4. _____

Problem 5. _____

Total. _____

Problem 1. (8 points) Consider a particle traveling according to the equations

$$x(t) = \cos^2 t, \quad y(t) = \cos t.$$

Write down and simplify (but do not evaluate) the formula for the length of the curve along which the particle is moving.

Problem 2. (10 points) Consider a particle whose velocity, at time $t \geq 0$, is given by

$$\vec{v}(t) = \langle -2t, -\sin t \rangle$$

and whose position at $t = 0$ is $(4, 0)$.

a. (6 points) Find the formula for the position of the particle at time t .

b. (4 points) Find the point at which the particle crosses the y axis.

Problem 3. (12 points) Find the equations of the normal and of the osculating planes to the curve

$$\vec{r}(t) = \langle t^3, \sin(\pi t), t + 1 \rangle$$

at the point corresponding to $t = 2$.

Problem 4. (8 points) Identify the curve

$$r = 2 \sin \theta + 2 \cos \theta$$

by finding a Cartesian equation for the curve. Give a verbal description of what that curve is.

Problem 5. (12 points) Consider the function of two variables

$$f(x, y) = \sqrt{1 + x - y^2}.$$

a. (4 points) Identify and sketch the domain of $f(x, y)$.

b. (4 points) Find the partial derivative $f_y(x, y)$.

c. (4 points) Find the second partial derivative $f_{xy}(x, y)$.