Name:_____

Recitation:_____

Math 203 - Fall 2018

First Examination
Thursday, Oct 4, 2018

Instructor: **Dror Varolin**

This examination contains 8 pages, including this title page and 4 sheets of scratch paper at the end, which you can tear out if you like .

Read all the questions carefully before starting the exam.

Use of Calculators or computers is not permitted!

Place your final answers in the squares provided!!

Show all your work!!!

Good Luck!!!!

Problem	Score
1	/25
2	/25
3	/25
4	/25
Total	/100

1. Consider the line L given by the vector equation $\mathbf{r}(t) = (4 + 2t, 1 + t, 3 - 2t)$.

    (a) Find a unit vector $\mathbf{v}$ parallel to this line. (5pts)

    $$\boxed{\mathbf{v} = }$$

    (b) Find the equation for the plane perpendicular to $\mathbf{v}$ and passing through the point $(-1, 2, 0)$. (10pts)

    $$\boxed{\text{Plane equation:} }$$

    (c) Find the distance from the origin to the line L. (10pts)

    $$\boxed{\text{Distance from } (0, 0, 0) \text{ to } L = }$$

2. Consider the curve
$$\mathbf{r}(t) = \left\langle 4\sin(t^2 - \pi t), 2e^{4(t-\pi)} \right\rangle.$$

(a) Find the unit tangent vector $\mathbf{T}(2\pi)$ at the point $\mathbf{r}(\pi)$. (10pts)

$$\boxed{\mathbf{T}(\pi) = }$$

(b) Find the unit normal vector $\mathbf{N}(\pi)$ at the point $\mathbf{r}(\pi)$. (15pts)

$$\boxed{\mathbf{N}(\pi) = }$$

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3. Find the length of the curve

$$\mathbf{R}(t) = \left(2e^t, 2e^{-t}, 2\sqrt{2}t\right), \qquad 0 \le t \le 3.$$
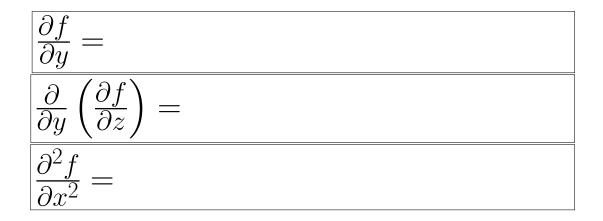
`Hint:` $(a + \frac{1}{a})^2 = ?$

Length is:

4. For the function
$$f(x, y, z) = z^2 \sin\left(\frac{xy}{z^2}\right),$$

calculate $\frac{\partial f}{\partial y}$, $\frac{\partial}{\partial y}\left(\frac{\partial f}{\partial z}\right)$ and $\frac{\partial^2 f}{\partial x^2}$. (5+10+10pts)

$$\frac{\partial f}{\partial y} =$$

$$\frac{\partial}{\partial y}\left(\frac{\partial f}{\partial z}\right) =$$

$$\frac{\partial^2 f}{\partial x^2} =$$

Scratch paper

Scratch paper

Scratch paper