Term Test 1

DATE: October 13, 2015
TIME: 60 minutes
COURSE: MATH 2720
EXAMINER: G.I. Moghaddam

NAME:_____

STUDENT # : _____

Q1 [9]	Q2 [7]	Q3 [9]	Q4 [6]	Q5 [9]	Total [40]

[9] 1. Identify and sketch the graph of the quadric surface

$$x^2 - y^2 + z^2 - 4x - 2y - 2z + 4 = 0\,.$$

Find the intersection point of this surface with the $x-$axis. Does this surface intersect the $y-$axis or the $z-$axis ?

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[7] 2. Let

$$\mathbf{u}(t) = \cos \pi t\, \hat{\mathbf{i}} - \sin \pi t\, \hat{\mathbf{j}} + 3\pi\, \hat{\mathbf{k}} \quad \text{and} \quad \mathbf{v}(t) = \frac{1}{2} \sin \pi t\, \hat{\mathbf{i}} + (1 + \frac{1}{2} \cos \pi t)\, \hat{\mathbf{j}} + 0\, \hat{\mathbf{k}}\,.$$

First find $\mathbf{u}(t) \times (2\,\mathbf{v}(t))$ and then evaluate the integral $\displaystyle\int \big(\mathbf{u}(t) \times (2\,\mathbf{v}(t))\big)\, dt$.

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3. Let C be the curve with vector function $\mathbf{r}(t) = \langle \frac{1}{2}t^2 , \frac{4}{3}t^{\frac{3}{2}} , 2t \rangle$.

[4] (a) Find the arc length of the curve C between the points at which $t = 0$ and $t = 2$.

[5] (b) Find the curvature of the curve C at the point at which $t = 1$.

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[6] 4. Let C be the curve with vector function $\mathbf{r}(t) = \langle\, e^t\,,\, \sqrt{2}\,t\,,\, e^{-t}\,\rangle\,.$

It is given that $\mathbf{r}'(0) = \langle\, 1\,,\, \sqrt{2}\,,\, -1\,\rangle$ and $\mathbf{N}(0) = \langle\, \frac{\sqrt{2}}{2}\,,\, 0\,,\, \frac{\sqrt{2}}{2}\,\rangle\,.$ Find the equation of the osculating plane of the curve C at the point $P(1, 0, 1)\,.$

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5. Let $f(x,y) = \dfrac{\sqrt{x^2 - y}}{\sqrt{2x}}$.

[4] (a) Find and sketch the domain of $f(x,y)$.

[5] (b) Identify the level curves of $f(x,y)$ and sketch only two of the level curves.