Minitest 4 - MTH 2410

Dr. Graham-Squire, Fall 2013

Name: ________________________________

I pledge that I have neither given nor received any unauthorized assistance on this exam.

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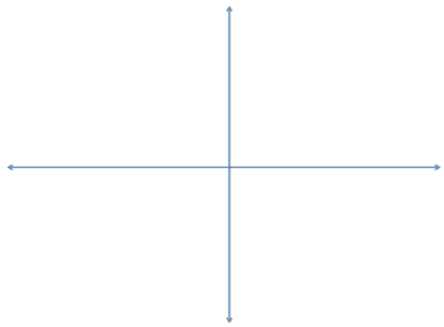
(*signature*)

DIRECTIONS

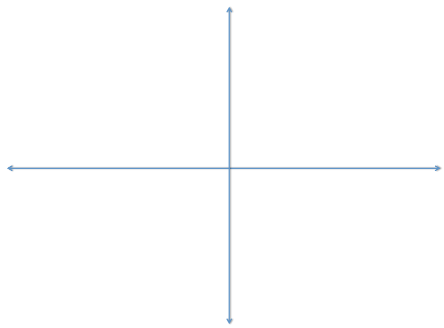
1. Show all of your work and use correct notation. A correct answer with insufficient work or incorrect notation will lose points.
2. Clearly indicate your answer by putting a box around it.
3. Calculators are allowed on all parts of the in-class portion of the test, though you should not need one.
4. Give all answers in exact form, not decimal form (that is, put π instead of 3.1415, $\sqrt{2}$ instead of 1.414, etc) unless otherwise stated.
5. Make sure you sign the pledge.
6. Number of questions = 6. Total Points = 30.

For the first four questions, evaluate the line integral using whatever technique you feel is most appropriate.

1. (5 points) Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle xy, y^2 \rangle$ and C is the curve from the origin to (2,0) in a straight line, then from (2,0) to (0,2) along a semicircular path of radius 2, then from (0,2) back to the origin in a straight line.



2. (5 points) Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle 2x + \tan y, x \sec^2 y \rangle$ and C is the curve from the origin to (1,1) along the graph of $y = x^2$, then from (1,1) back to (0,0) along the graph of $y = \sqrt{x}$.



3. (5 points) Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle xy, yz, zx \rangle$ and C is the curve given by $x = t$, $y = t^2$, $z = t^3$ from the point (0,0,0) to (2, 4, 8).

4. (5 points) Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle y^2, 2xy + e^{3z}, 3ye^{3z} \rangle$ and C is the curve given by $x = t^2$, $y = \sqrt{t}$, $z = t/2$ from $t = 0$ to $t = 4$.

5. (5 points) Set up, but do not evaluate an iterated integral to calculate the surface integral $\iint_S x^2 z^2 dS$ where S is the part of the cone $z^2 = x^2 + y^2$ that lies between the planes $z = 1$ and $z = 3$.

6. (5 points) Use an iterated integral to find the surface area of the sphere of radius q, given parametrically by

$$\mathbf{r}(u, v) = q \sin u \cos v \mathbf{i} + q \sin u \sin v \mathbf{j} + q \cos u \mathbf{k}$$

where the domain D is $0 \leq u \leq \pi$ and $0 \leq v \leq 2\pi$. Hint: the answer is $4\pi q^2$.

Extra Credit(1 to 3 points) Choose whether you want to get 1 or 3 extra credit points. If you choose 1, you are guaranteed to get 1 point. If you choose 3 and no one else chooses 3, you get 3 points. But if anyone else in the class also chooses 3, everyone who chooses 3 will get zero.