CALCULUS III NAME _____

EXAM III Rec. Instr. _____

SPRING 2003 Rec. Time _____

TO RECEIVE CREDIT YOU MUST SHOW YOUR WORK.

(20) 1) A mass distribution occupies the 3D-region in the 1st octant which is enclosed by the surfaces $y = x^2$, $y = 4$, $x = 0$, $z = y$ and $z = 6$. If the mass density function is $\delta = x$ units of mass/unit volume, calculate the total mass.

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(15) 2. A mass distribution occupies the 3D-region which is above $z = x^2 + y^2$ and under $z = 9$. If the mass density function is $\delta = \sqrt{z}$ units of mass/unit volume, calculate the total mass.

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(15) 3) A mass distribution occupies the 3D-region which is between the spheres $x^2 + y^2 + z^2 = 1.$ and $x^2 + y^2 + z^2 = 9$ If the mass density function is $\delta = z^2$ units of mass/unit volume, calculate the total mass.

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(15) 4) Calculate the area of that part of the paraboloid $z = x^2 + y^2$ which is between the cylinders $x^2 + y^2 = 1$ and $x^2 + y^2 = 9$.

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(20) 5) Calculate the area of the parametrized surface $x = t+s$, $y = 2t^{\frac{3}{2}}$, $z = t - s$, $0 \leq s \leq 3$, $0 \leq t \leq 2$.

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(15) 6) Evaluate $\int_C y\,dx - x\,dy$ where C is the directed curve which consists of $y = x^2$ from $(0,0)$ to $(1,1)$ followed by that part of $x^2 + y^2 = 2$ in the 1st quadrant from $(1,1)$ to $(0,\sqrt{2})$.