CALCULUS III NAME _____

EXAM III Rec. Instr. _____

SPRING 2001 Rec. Time _____

TO RECEIVE CREDIT YOU MUST SHOW YOUR WORK.

(10) 1. Find the volume of the 3D-region which is under $z = x + 2y$ and above the region of the xy-plane that is bounded by the lines $y = 2x$, $y = 0$ and $x = 2$.

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(15) 2. Find the volume of the 3D-region in the first octant which is bounded by the surfaces $x = y^2$, $y = 2$, $x = 0$, $z = x$ and $z = 6$.

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(15) 3. Evaluate $\int_0^2 \int_{x^2}^4 (1+y^2)^{10} x \, dy \, dx$ by **first reversing the order of integration**.

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(15) 4. A mass distribution occupies the region enclosed by the surface $z = x^2 + y^2$ and the plane $z = 4$. The mass density function is $\delta = 2z$ units of mass/unit volume. Calculate the total mass.

(15) 5. A mass distribution occupies the region between the spheres $x^2+y^2+z^2 = 1$ and $x^2 + y^2 + z^2 = 9$. The mass density function is $\delta = z^2$ units of mass/unit volume. Calculate the total mass. **Use spherical coordinates to evaluate the triple integral.**

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(15) 6. Find the area of that part of the surface $z = y^2 + 2x$ which is above the region of the xy-plane bounded by the lines $y = x$, $x = 0$ and $y = 2$.

(15) 7. Find the area of the parametrized surface $x = t^3$, $y = t$, $z = s^2t^3$, $0 \leq t \leq 1$, $0 \leq s \leq 4$.