

CALCULUS III

NAME _____

EXAM 3

Rec. Instr. _____

FALL 1996

Rec. Time _____

TO RECEIVE CREDIT YOU MUST SHOW YOUR WORK.

- (15) 1. Find the volume of the region which is under $z = 3x + 6xy$ and above the region of the xy -plane bounded by $y = 2x$, $x = 0$ and $y = 2$.

NAME _____

Rec. Instr. _____

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

NAME _____

Rec. Instr. _____

(15) 3. Find the volume of the region which is under $z = 10 - x^2 - y^2$ and above the plane $z = 1$.

NAME _____

Rec. Instr. _____

- (15) 4. A massive body occupies the region which is bounded by the surfaces $y = x^2$, $y = 4$, $z = 1$ and $z = 1 + y$. The mass density function is $\delta(x, y, z) = y$. Calculate the total mass.

NAME _____

Rec. Instr. _____

- (15) 5. A mass distribution is in the region above $z = \sqrt{x^2 + y^2}$ and inside the sphere $x^2 + y^2 + z^2 = 4$. The mass density function is $\delta(x, y, z) = z$. Use a triple integral in spherical coordinates to find the total mass.

NAME _____

Rec. Instr. _____

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

NAME _____

Rec. Instr. _____

(15) 7. The force field $\vec{F} = y\vec{i} - x\vec{j}$ acts on an object as it moves in the plane. Calculate the work done by \vec{F} as the object moves from $(0, 0)$ to $(4, 4)$ as follows.

first; along $y = x^2$ from $(0, 0)$ to $(2, 4)$

second; along the line segment from $(2, 4)$ to $(4, 4)$