1st Final Exam for Calculus A2-EE

Class：_____   Name：_____   Student ID #：_____

1. Calculate the iterated integral by first reversing the order of integration: $\int_0^1 \int_{\sqrt{y}}^1 \frac{ye^{x^2}}{x^3} \, dx \, dy$.

2. Calculate the value of the double integral $\iint_D (x^2 + y^2)^{3/2} \, dA$, where D is the region in the first quadrant bounded by the lines $y = 0$ and $y = x$ and the circle $x^2 + y^2 = 2$.

3. Use the transformation: $x = 4u, \quad y = 3v$ to evaluate the area of the region R which is inside the ellipse $9x^2 + 16y^2 = 144$ by finding the double integral $\iint_R 1 \, dA$.

4. Evaluate the iterated integral: $\displaystyle\int_0^4 \int_0^{\sqrt{4x-x^2}} \sqrt{x^2 + y^2} \, dy \, dx$.

5. Evaluate the integral by making an appropriate change of variables: $\displaystyle\iint_R \cos\left(\frac{y-x}{y+x}\right) dA$, where R is the trapezoidal region with vertices $(1,0)$, $(2,0)$, $(0,2)$, and $(0,1)$.

6. Let D be the solid tetrahedron with vertices (0,0,0), (0,0,4), (0,4,0), and (2,0,0).

   (a) Find the volume of the solid tetrahedron D

   (b) Find the area of the upper part of the solid tetrahedron D.

7. Find the volume of the solid above the paraboloid $z = x^2 + y^2$ and below the half-cone $z = \sqrt{x^2 + y^2}$.

8. Calculate the value of the triple integral $\iiint_{H^-} z^3 \sqrt{x^2 + y^2 + z^2}\, dV$, where H^- is the solid hemisphere that lies below the xy-plane and has center the origin and radius 1.