Review for Exam 3.

1. Calculate the iterated integral $\int_0^1 \int_x^1 e^{x/y}\, dy\, dx$ by reversing the order of integration.
2. Evaluate the integral $\iint_D (xy + 2x + 3y) dA$, where D is the region bounded by $x = 1 - y^2$, $y = 0$, $x = 0$.
3. Evaluate the integral $\iint_D (x^2 + y^2)^{3/2} dA$, where D is the region bounded by the lines $y = 0$, $y = \sqrt{3}x$, and the circle $x^2 + y^2 = 9$.
4. Find the volume of the solid under $z = x^2 y$ and above the triangle in the (xy)-plane with vertices (1,0), (2,1), (4,0).
5. Evaluate $\iint_E yz\, dV$, where E lies above the plane $z = 0$, belov the plane $z = y$ and inside the cylinder $x^2 + y^2 = 4$.
6. Evaluate $\iint_E y^2 z^2\, dV$, where E is the solid bounded by the paraboloid $x = 1 - y^2 - z^2$, and the plane $x = 0$.
7. Convert the integral
$$\int_0^3 \int_0^{\sqrt{9-y^2}} \int_0^{\sqrt{9-x^2-y^2}} (x^2 + y^2 + z^2)\, dz\, dx\, dy$$
to an integral in spherical coordinates, but don't evaluate it.
8. Use cylindrical and spherical coordinates to find the volume of the ice-cream cone bounded above by the sphere $x^2 + y^2 + z^2 = 5$ and below by the cone $z = \sqrt{\dfrac{x^2 + y^2}{3}}$.
9. Evaluate $\iiint_E x e^{(x^2+y^2+z^2)^2} dV$ if the E is the solid that lies between the spheres $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 4$ in the first octant.
10. Use the given transformation to evaluate the integral
    (a) $\iint_R (x + y) e^{x^2 - y^2} dA$, where R is the rectangle enclosed by the lines $x - y = 0$, $x - y = 2$, $x + y = 0$ and $x + y = 3$.
    (b) $\iint_R x^2\, dA$, where R is the region bounded by the ellipse $9x^2 + 4y^2 = 36$, $x = 2u$, $y = 3v$.