Question 1: Compute $\iint_R xy\sqrt{x^2+y^2}\,dA$ where $R = [0,1] \times [0,1]$.

[5]

Question 2: Calculate $\int_0^2 \int_{x^2}^4 x^3 e^{y^3}\,dy\,dx$ (reversing the order of integration may help here.)

[5]

Question 3: Determine the volume of the solid that lies under the plane $x + 2y - z = 0$ and above the region in the xy-plane bounded by $y = x$ and $y = x^2$.

[5]

Question 4: Determine the volume of the solid in the first octant that lies between the paraboloid $z = 1+x^2+y^2$ and the plane $z = 10$. (Polar coordinates may be helpful here.)

[5]

Question 5: Evaluate $\iiint_E x \, dV$ where E is the solid tetrahedron with vertices $(0, 0, 0)$, $(2, 0, 0)$, $(0, 1, 0)$ and $(0, 0, 4)$

[10]

Question 6: Evaluate $\iiint_E xy^2$ where E is the solid in the first octant that is bounded by the cylinders $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$, and on top by the plane $y + z = 3$.

[10]

Question 7: Express the integral

$$\int_{-1}^{1}\int_{x^2}^{1}\int_{0}^{1-y} f(x,y,z)\,dz\,dy\,dx$$

as an iterated integral in the order $dx\,dy\,dz$

[5]