TRIPLE INTEGRALS - PRACTICE PROBLEMS

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November 25, 2023

1. Evaluate $\displaystyle\int_2^3 \int_{-1}^4 \int_1^0 4x^2 y - z^3 \, dz \, dy \, dx$

2. Evaluate $\displaystyle\int_0^1 \int_0^{z^2} \int_0^3 y \cos\left(z^5\right) \, dx \, dy \, dz$

3. Evaluate $\displaystyle\iiint\limits_E 6z^2 \, dV$ where E is the region below $4x + y + 2z = 10$ in the first octant.

4. Evaluate $\displaystyle\iiint\limits_E 3 - 4x \, dV$ where E is the region below $z = 4 - xy$ and above the region in the xy-plane defined by $0 \le x \le 2, 0 \le y \le 1$.

5. Evaluate $\displaystyle\iiint\limits_E 12y - 8x \, dV$ where E is the region behind $y = 10 - 2z$ and in front of the region in the xz-plane bounded by $z = 2x, z = 5$ and $x = 0$.

6. Evaluate $\displaystyle\iiint\limits_E yz \, dV$ where E is the region bounded by $x = 2y^2 + 2z^2 - 5$ and the plane $x = 1$.

7. Evaluate $\displaystyle\iiint\limits_E 15z \, dV$ where E is the region between $2x + y + z = 4$ and $4x + 4y + 2z = 20$ that is in front of the region in the yz-plane bounded by $z = 2y^2$ and $z = \sqrt{4y}$.

8. Use a triple integral to determine the volume of the region below $z = 4 - xy$ and above the region in the xy-plane defined by $0 \le x \le 2, 0 \le y \le 1$.

9. Use a triple integral to determine the volume of the region that is below $z = 8 - x^2 - y^2$ above $z = -\sqrt{4x^2 + 4y^2}$ and inside $x^2 + y^2 = 4$.