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20BCS4643

Q. $\int_0^2 \int_1^2 \int_0^{yz} xyz \, dx \, dy \, dz \, dy$

$= \int_0^2 \int_1^2 \left[ \int_0^{yz} \frac{x^2}{2} (yz) \, dx \right] dz \, dy$

$= \frac{1}{2} \int_0^2 \int_1^2 \left[ \frac{x^2}{2} (yz) \right]_0^{yz} dz \, dy$

$= \frac{1}{2} \int_0^2 \int_1^2 \left[ (yz) \left[ (yz)^2 \right] \right] dz \, dy$

$= \frac{1}{2} \int_0^2 \left[ \int_1^2 (y^3 z^3) \right] dz \, dy$

$= \frac{1}{2} \int_0^2 \left[ \int_1^2 (y^3) \cdot \frac{z^4}{4} \right] dz \, dy$

$= \frac{1}{4 \times 2} \int_0^2 \left[ (y^3) (z^4) \right]_1^2 dy$

$= \frac{1}{8} \int_0^2 \left[ (y^3) (2^4 - 1^4) \right] dy$

$= \frac{1}{8} \int_0^2 \left[ (y^3) (15) \right] dy$

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$$= \frac{1}{8}\int_0^2 y^3 (2^4 - 1^4)\, dy$$

$$= \frac{1}{8}\int_0^2 y^3 (16 - 1)\, dy$$

$$= \frac{1}{8}\int_0^2 y^3 (15)\, dy$$

$$= \frac{15}{8}\int_0^2 y^3\, dy$$

$$= \frac{15}{8}\left[\frac{y^4}{4}\right]_0^2 dy$$

$$= \frac{15}{8\times 4}\left[y^4\right]_0^2$$

$$= \frac{15}{8\times 4}(2^4 - 2^0)$$

$$= \frac{15}{32} \times (16 - 1)$$

$$= \frac{15 \times 15}{32}$$