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17.3 ~~1~~, ~~3~~, 5, 7, 11, 15
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* Checkover (Renew?) *

(1) $F(x,y,z) = \langle z, x, y \rangle$ $[0,4] \times [0,2] \times [0,3]$

$\text{div}F = \frac{\partial}{\partial x}(z) + \frac{\partial}{\partial y}(x) + \frac{\partial}{\partial y}(y)$

$= 0 + 0 + 0 = 0$

$\iiint_R \text{div}F\, dV = \iiint 0 \cdot dV = \boxed{0}$

(3) $F(x,y,z) = \langle 2x, 3z, 3y \rangle$ $x^2+y^2+z^2 \le 4$

$\text{div}F = 2$ dV = area of region $r=2$

$\iiint_R 2 \cdot dV = \iiint_R 2 \cdot r\, dr\, d\theta = \boxed{4\pi}$

(5) $F(x,y,z) = \langle 0, 0, \frac{z^3}{3} \rangle$ $x^2+y^2+z^2=1$

$\text{div}F = z^2$ area of

$\iiint_R z^2 dV = \int_0^{2\pi}\int_0^2 z^2\, dz\, d\theta$

$= \frac{z^3}{3}\Big|_0^2 = \frac{8}{3}$

$\int_0^{2\pi} \frac{8}{3} = \frac{16\pi}{3}$

(7) $F(x,y,z) = \langle xy^2, yz^2, zx^2 \rangle$

$x^2+y^2 \le 4$, $0 \le z \le 3$

$\text{div}F = y^2 + z^2 + x^2$

$\int_0^{2\pi}\int_0^2\int_0^3 (y^2+z^2+x^2)\, dz\, dr\, d\theta$

(11) $F(x,y,z) = \langle x^3, 0, z^3 \rangle$

$\text{div}F = 3x^2 + 3z^2$

$\iiint_R (3x^2+3z^2)\, dV$

$0\ 0\ 0$

(15) $F(x,y,z) = \langle x+y, z, z-x \rangle$

$\text{div}F = 1 + 0 + 1$

$= 2$

$\iiint 2\, dV = \int_0^{\pi/2}\int_0^3 2r\, dr\, d\theta \rightarrow \int_0^{\pi/2} 9\, d\theta$

$\boxed{9\pi/2}$