1. $\int_{-9}^{9}\int_{-\sqrt{81-y^2}}^{\sqrt{81-y^2}}\int_{-\sqrt{81-x^2-y^2}}^{\sqrt{81-x^2-y^2}} f\left(x,y,z\right)dzdxdy$
2. 364
3. $6-2\ln 4$
4. $\int_0^1\int_0^{12}\int_0^{\frac{x}{4}}\frac{4\cos\left(x^2\right)}{5\sqrt{z}}dydxdz=\frac{1}{5}\sin 144$
5. $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\int_0^3\int_0^2 e^{-r^2}rdzdrd\theta=\frac{\pi}{4}\left(1-e^{-9}\right)$
6. $\int_0^{2\pi}\int_0^4\int_{\sqrt{25+x^2+y^2}}^{\sqrt{41}} rdzdrd\theta=-\frac{34}{3}\pi\sqrt{41}+\frac{250}{3}\pi$
7. $\int_0^{2\pi}\int_0^{\pi}\int_0^2 7e^{-\rho^3}\rho^2\sin\varphi d\rho d\varphi d\theta=\frac{28\pi}{3}\left(1-e^{-8}\right)$
8. $\left(\bar{x},\bar{y}\right)=\left(\frac{M_y}{m},\frac{M_x}{m}\right)=\left(\frac{8}{21},\frac{22}{21}\right)$
9. $\left(\bar{x},\bar{y},\bar{z}\right)=\left(\frac{M_{yz}}{m},\frac{M_{xz}}{m},\frac{M_{xy}}{m}\right)=\left(\frac{8}{3},\frac{11}{21},\frac{4}{3}\right)$
10. B
11. One correct answer is $\langle 0,y\rangle$.
12. $\left\langle\frac{8x}{4x^2+y^2+4z^2},\frac{2y}{4x^2+y^2+4z^2},\frac{8z}{4x^2+y^2+4z^2}\right\rangle$
13. $\sqrt{65}\int_{-2\pi}^{0}\left(8\sin t-t\right)dt=2\pi^2\sqrt{65}$
14. $32\sqrt{2}\int_0^1\frac{1}{2\left(1+32t\right)}dt=\frac{\sqrt{2}}{2}\ln 33$
15. Circulation is 0. Flux is -25π.
16. Conservative, $\varphi\left(x,y,z\right)=2xyz$
17. $\varphi\left(\frac{\sqrt{3}}{2},\frac{1}{2}\right)-\varphi\left(0,1\right)=\frac{\sqrt{3}}{4}$
18. $\frac{10}{9}$
19. 0, because the vector field is conservative.

20. Two-dimensional curl of F is $8y^3+50x^6$. The two-dimensional divergence is $36x^5y+24xy^2$.

21. $\int_0^{\pi}\int_0^{\sin x}\left(18x^2-8xy\right)dydx=17\pi^2-72$

22. $\int_0^{\frac{\pi}{2}}\int_0^{\frac{\pi}{2}}\left(-y\sin x-0\right)dydx=-\frac{\pi^2}{8}$

23. div $\mathrm{F}=-4xyz$

24. curl of $\mathrm{F}=\langle 0,0,4y\rangle$