Calc 3

10.6.20

11–20 ▪ Find the traces of the given surface in the planes $x = k$, $y = k$, $z = k$. Then identify the surface and sketch it.

17. $x^2 + 4z^2 - y = 0$

18. $x^2 + 4y^2 + z^2 = 4$

19. $y = z^2 - x^2$

20. $16x^2 = y^2 + 4z^2$

11.6.40

40. Find the points on the ellipsoid $x^2 + 2y^2 + 3z^2 = 1$ where the tangent plane is parallel to the plane $3x - y + 3z = 1$.

12.1.12

11–20 ▪ Calculate the iterated integral.

11. $\int_1^3 \int_0^1 (1 + 4xy)\, dx\, dy$

12. $\int_2^4 \int_{-1}^1 (x^2 + y^2)\, dy\, dx$

13.5.18

11–16 ▪ Determine whether or not the vector field is conservative. If it is conservative, find a function f such that $\mathbf{F} = \nabla f$.

11. $\mathbf{F}(x, y, z) = yz\,\mathbf{i} + xz\,\mathbf{j} + xy\,\mathbf{k}$

12. $\mathbf{F}(x, y, z) = 3z^2\,\mathbf{i} + \cos y\,\mathbf{j} + 2xz\,\mathbf{k}$

13. $\mathbf{F}(x, y, z) = 2xy\,\mathbf{i} + (x^2 + 2yz)\,\mathbf{j} + y^2\,\mathbf{k}$

14. $\mathbf{F}(x, y, z) = e^z\,\mathbf{i} + \mathbf{j} + xe^z\,\mathbf{k}$

15. $\mathbf{F}(x, y, z) = ye^{-x}\,\mathbf{i} + e^{-x}\,\mathbf{j} + 2z\,\mathbf{k}$

16. $\mathbf{F}(x, y, z) = y \cos xy\,\mathbf{i} + x \cos xy\,\mathbf{j} - \sin z\,\mathbf{k}$

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17. Is there a vector field $\mathbf{G}$ on $\mathbb{R}^3$ such that $\operatorname{curl} \mathbf{G} = xy^2\,\mathbf{i} + yz^2\,\mathbf{j} + zx^2\,\mathbf{k}$? Explain.

18. Is there a vector field $\mathbf{G}$ on $\mathbb{R}^3$ such that $\operatorname{curl} \mathbf{G} = yz\,\mathbf{i} + xyz\,\mathbf{j} + xy\,\mathbf{k}$? Explain.