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1. An open box is to contain a volume of 3 cubic meters. Given that the material for the sides of the box costs 6 per square meter and the material for the bottom costs 9 per square meter, express the total cost C of the box as a function of the length l and width w .
2. Consider the level surfaces of $f(x, y, z) = x^2 + 2x + y^2 + 6y + 20 - z^2$. For what values of C is the surface with equation $f(x, y, z) = C$
 - (a) A hyperboloid of one sheet?
 - (b) A hyperboloid of two sheets?
3. Determine whether the function $f(x, y) = \frac{x^3}{x^2+y^2}$ has a limit as $(x, y) \rightarrow (0, 0)$. If so, evaluate the limit.
4. Determine whether the function $f(x, y) = \frac{x}{x^2+y^2}$ has a limit as $(x, y) \rightarrow (0, 0)$. If so, evaluate the limit.
5. Let $f(x, y) = \sin(x) \sinh(y)$. Calculate:
 - (a) $f_x(x, y)$
 - (b) $f_y(x, y)$
 - (c) $f_{xx}(x, y)$
 - (d) $f_{xx}(x, y) + f_{yy}(x, y)$.
6. Find the gradient of $f(x, y) = \tan^{-1}\left(\frac{y}{x}\right)$. Can you identify f with a simple geometric quantity?