

Due 6/11/2012

1. Using optimization from Calculus 1, find the point on the x -axis that is closest to the point (a, b, c) . Find the distance between the two points.
2. Find an equation of the plane that contains the line $y = -2x + 3$ in the plane $z = 5$, and goes through the point $(2, -7, 23)$.
3. Suppose the contour diagram of $f(x, y)$ is given by

Sketch the contour diagrams of

- (a) $f(x - 1, y)$
 (b) $2f(x, y)$
 (c) $f(x, -y) + 3$
 (d) $f(y, x)$

1. Give a formula for a function whose graph is a cone with circular cross section, vertex at $(2, -1, 5)$, and opening in the negative x direction. (The axis of symmetry is parallel to the x -axis.)
2. Find a function $y = g(x)$ so that

$$f(x, y) = \begin{cases} \frac{5x^6 - 5x^4y + x^2y^2 - y^3}{x^2 - y} & \text{if } y \neq x^2 \\ g(x) & \text{if } y = x^2 \end{cases}$$

is continuous everywhere.

3. At time t , the displacement of a point on a vibrating guitar string stretched between $x = 0$ and $x = \pi$ is given by the function

$$f(x, t) = \cos(t) \sin(x), \quad 0 \leq x \leq \pi, \quad 0 \leq t \leq 2\pi$$

- (a) Sketch the cross sections of this function with t fixed at $t = 0$ and $t = \frac{\pi}{4}$. Sketch the cross sections of this function with x fixed at $x = \frac{\pi}{4}$ and $x = \frac{\pi}{2}$.
- (b) What is the value of f if $x = 0$ or $x = \pi$? Explain why this is to be expected.