

9.6 - Staying Cool

Let $T(x, y)$ be the temperature in a 10 ft by 10 ft room on a winter night. One corner of the room is at $(0,0)$ and the opposite corner is at $(10,10)$. For each of the following functions, $T(x, y)$,

- a. Draw, or describe in words, or plot with GeoGebra a graph of the temperature function. Useful prototype commands in GeoGebra: (This should plot one quadrant of a sphere)

```
function(sqrt(81-x^(2))-y^(2)), 0, 10, 0, 10)
```

```
z=4
```

The last four numbers are the x -range to plot, $0 < x < 10$, and then the y -range to plot, also 0 to 10. The command `z=4` will display the plane perpendicular to $\hat{\mathbf{z}}$ at a height of $z = 4$. This lets you easily see what part of the surface is above 4 and what part is below 4. \diamond Now, for each of the Temperature functions, $T(x, y)$ for this 10 by 10 foot room, plot $z = T(x, y)$. Use your plot to answer these questions:

- b. Describe the likely floor locations of the heating vents. Sketch the locations on a 10 by 10 square.
- c. Suppose you like to sleep with a temperature of 70° or less. Where would you put your bed? Again, sketch locations on a square.

1. $T(x, y) = 78 - \frac{1}{10} [x^2 + (y - 5)^2]$

2. $T(x, y) = \frac{1}{2}x - y + 75$

9.6 - The matching game

Match each function with its graph. Give reasons for your choices.

$$3) f(x, y) = \cos(x + y^2)$$

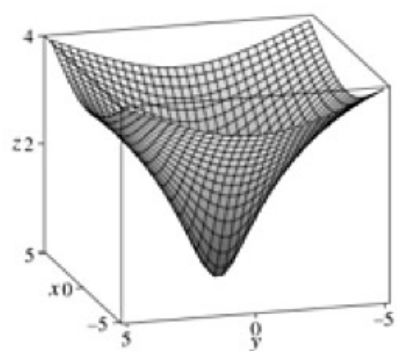
$$1) f(x, y) = \frac{1}{x+1} + \sin y.$$

$$2) f(x, y) = \sqrt{4 - x^2 - y^2}$$

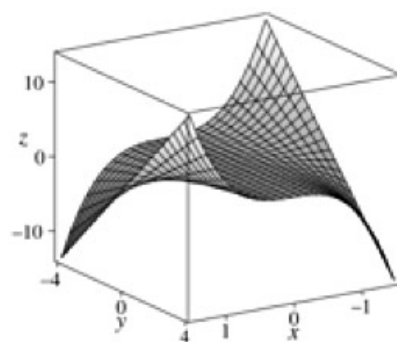
$$4) f(x, y) = \ln(x^2 + y^2 + 1)$$

$$5) f(x, y) = x^2 \sqrt{y}$$

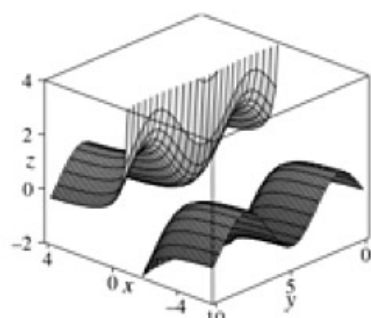
$$6) f(x, y) = x^3 y$$



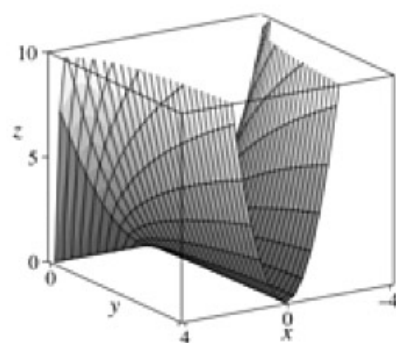
I



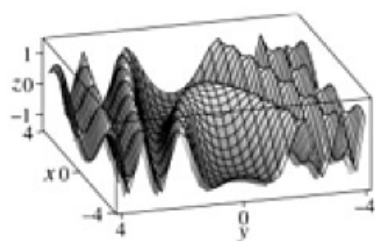
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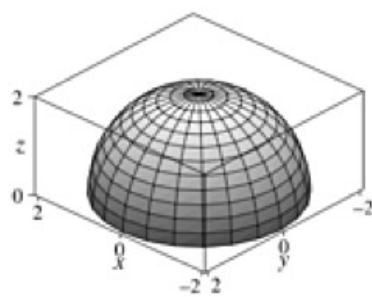
III



IV



V



VI