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7. Scaffolded example

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Lecture due Aug 4, 2021 20:30 IST Completed



Synthesize

In the problems that follow, we will use slicing to visualize the three dimensional graph of the function $z = x^2 - y^2$.

Intersections with planes, 1

2.0/2 points (graded)
Find the equation of the surface $z = x^2 - y^2$ intersected with the yz -plane.

$z =$ ✓ Answer: -y^2

Find the equation of the surface $z = x^2 - y^2$ intersected with the xz -plane.

$z =$ ✓ Answer: x^2

? INPUT HELP

Solution:

The intersection with the yz -plane is found by setting $x = 0$ in the equation for the surface:

$$z = -y^2$$

The intersection with the xz -plane is found by setting $y = 0$ in the equation for the surface:

$$z = x^2$$

Submit

You have used 1 of 10 attempts

i Answers are displayed within the problem

Intersections with planes, 2

1.0/1 point (graded)
Plot the intersection of the surface $z = x^2 - y^2$ with the planes $x = 0$ and $x = 1$.

Note that when drawing the function, you may choose between using the freeform or spline drawing tool using the dropdown menu in the menu of the sketch response tool. The freeform tool draws like a regular pencil using your mouse. The spline tool allows you to pick a series of discrete points, and it then connects them (once you have two or more points) with a curve.

Select

Intersection
x=0 ▾

Intersection
x=1 ▾

Delete

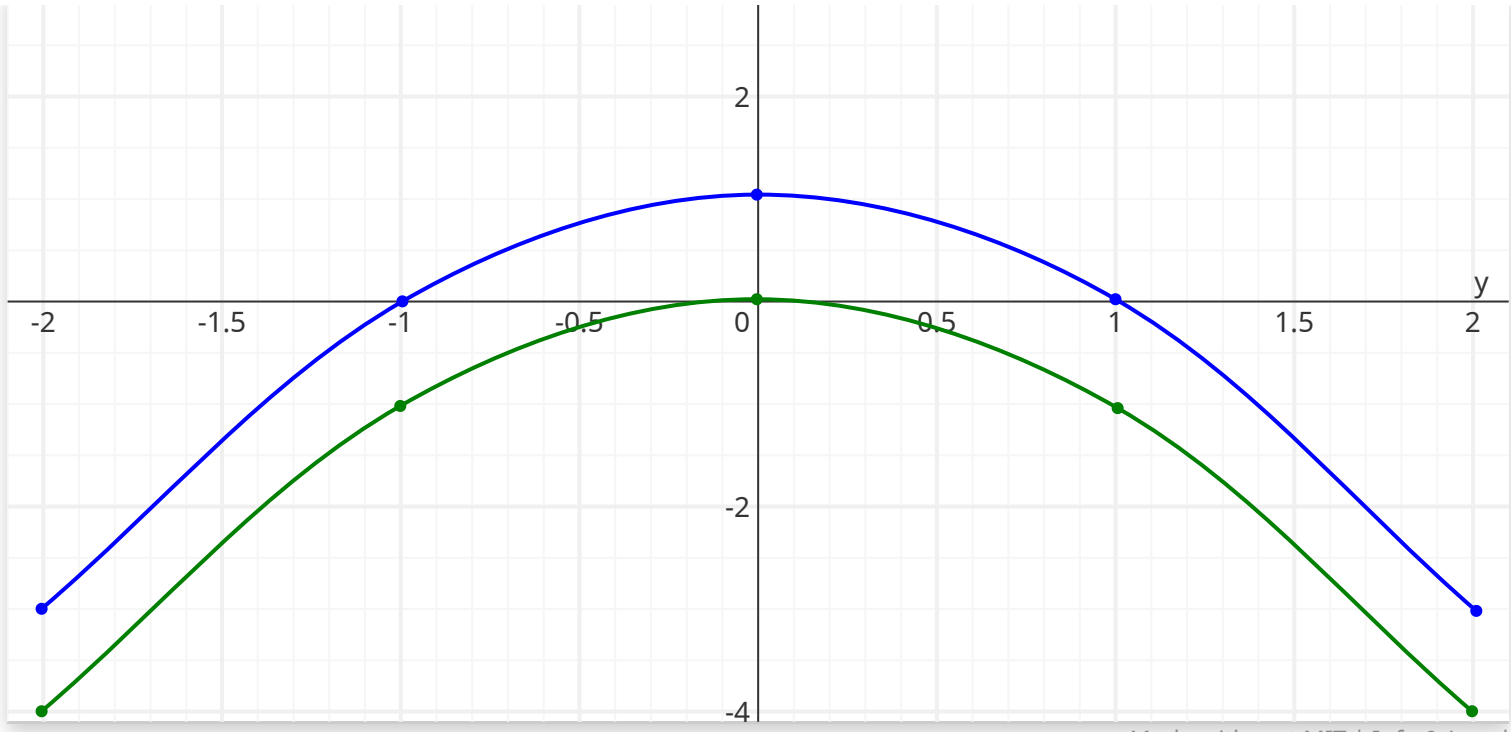
Undo

Redo

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4 | z



Answer: See solution.

✓
Good Job

Solution:

The intersection with the yz -plane defined by $x = 0$ gives the curve $z = 0^2 - y^2 = -y^2$.

The intersection with the plane $x = 1$ gives the curve $z = 1^2 - y^2 = 1 - y^2$.

Submit

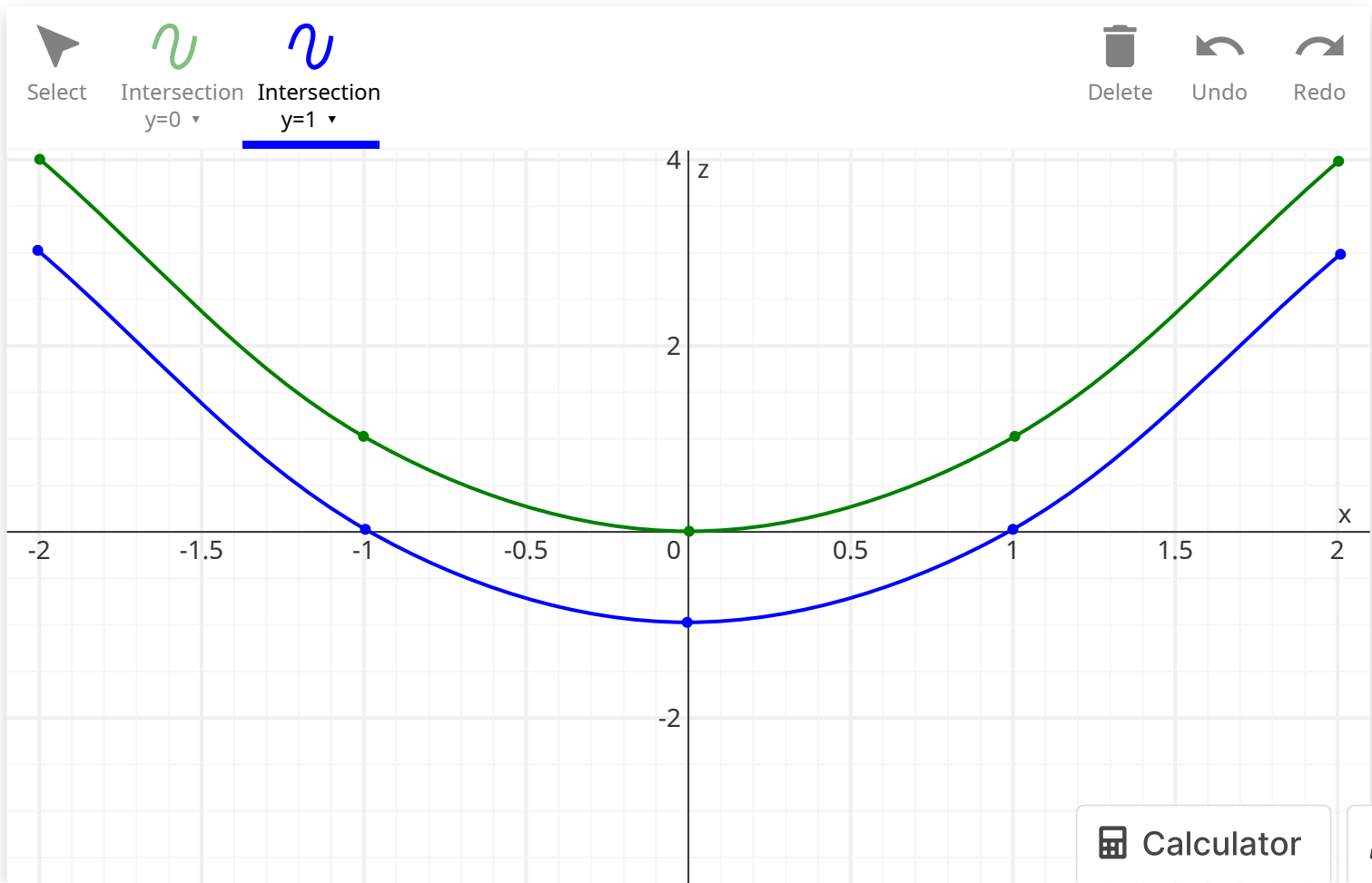
You have used 1 of 10 attempts

ⓘ Answers are displayed within the problem

Intersections with planes, 3

1.0/1 point (graded)
Plot the intersection of the surface $z = x^2 - y^2$ with the planes $y = 0$ and $y = 1$.

Note that when drawing the function, you may choose between using the freeform or spline drawing tool using the dropdown menu in the menu of the sketch response tool. The freeform tool draws like a regular pencil using your mouse. The spline tool allows you to pick a series of discrete points, and it then connects them (once you have two or more points) with a curve.



Answer: See solution.

✓
Good Job

Solution:

The intersection with the xz -plane defined by $y = 0$ gives the curve $z = x^2 - 0^2 = x^2$.

The intersection with the plane $y = 1$ gives the curve $z = x^2 - 1^2 = x^2 - 1$.

Submit

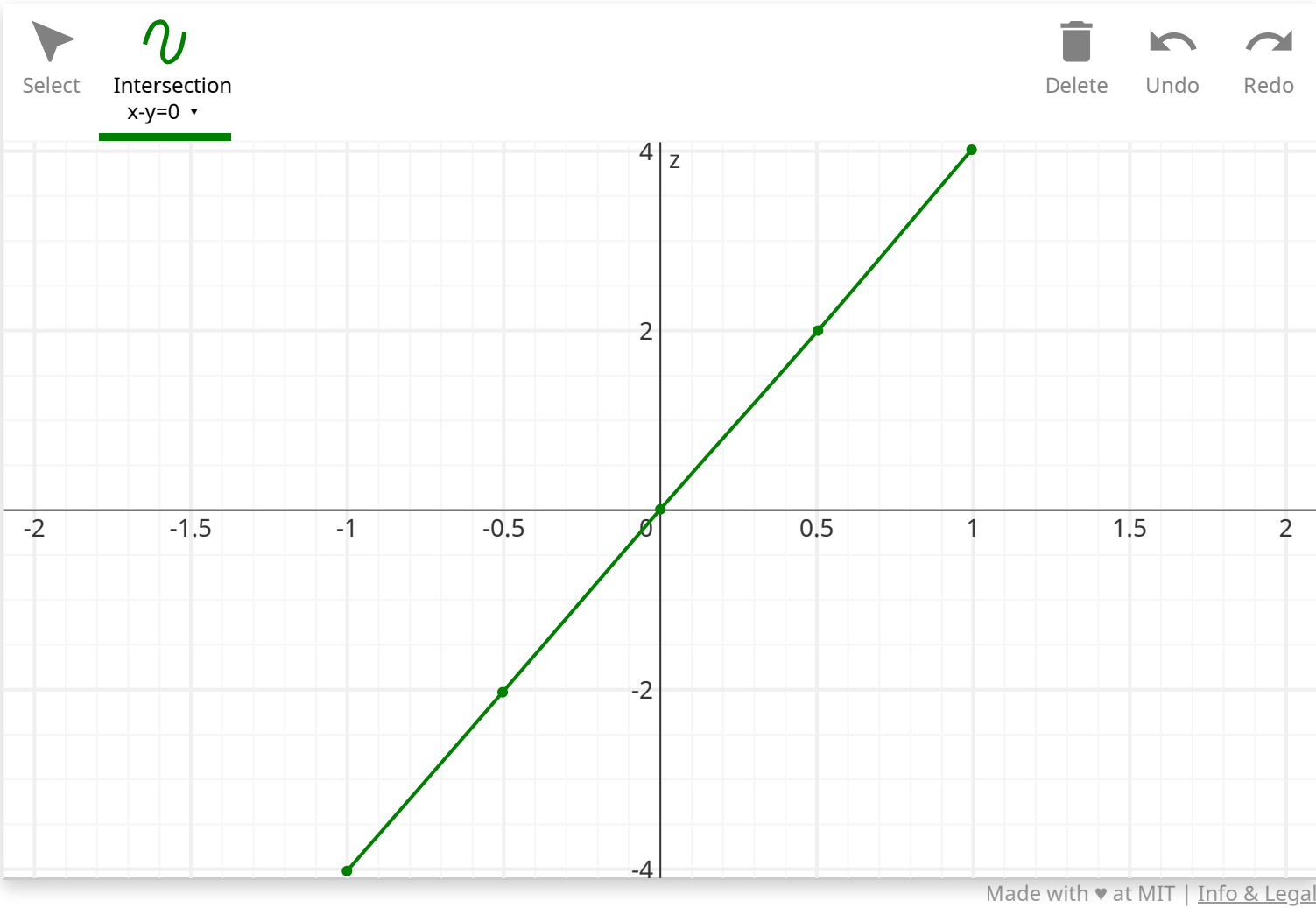
You have used 1 of 10 attempts

i Answers are displayed within the problem

Intersections with planes, 4

0/1 point (graded)
Plot the intersection of the surface $z = x^2 - y^2$ with the plane $x - y = 0$.

Note that when drawing the function, you may choose between using the freeform or spline drawing tool using the dropdown menu in the menu of the sketch response tool. The freeform tool draws like a regular pencil using your mouse. The spline tool allows you to pick a series of discrete points, and it then connects them (once you have two or more points) with a curve.



Answer: See solution.

✗
There is an issue with your intersection. Try plugging in $y=x$ and plotting.

Solution:

The intersection is given by $z = x^2 - x^2 = 0$. Thus the graph is a horizontal line through the origin.

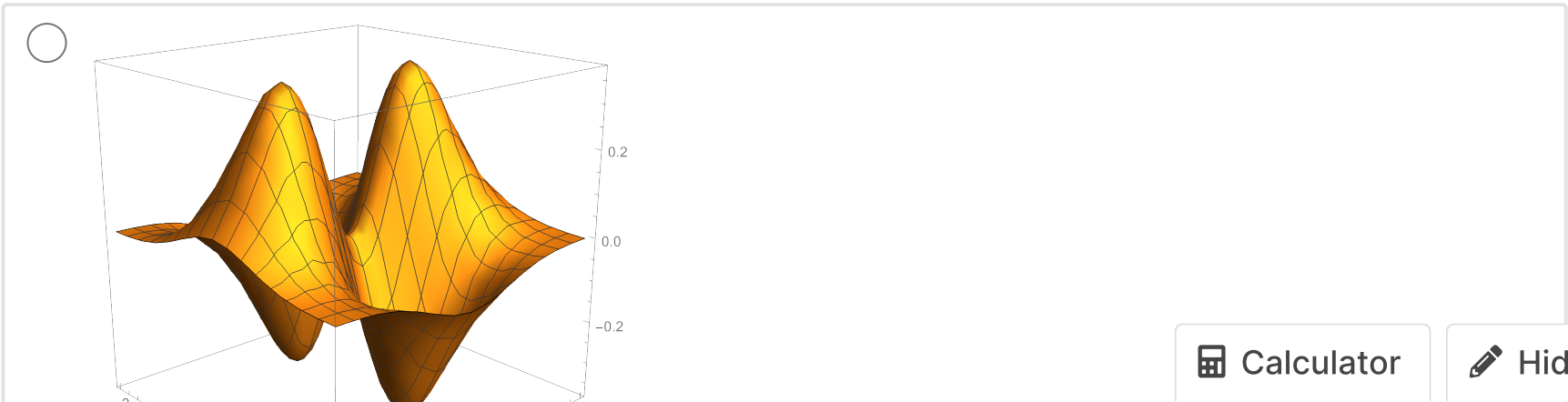
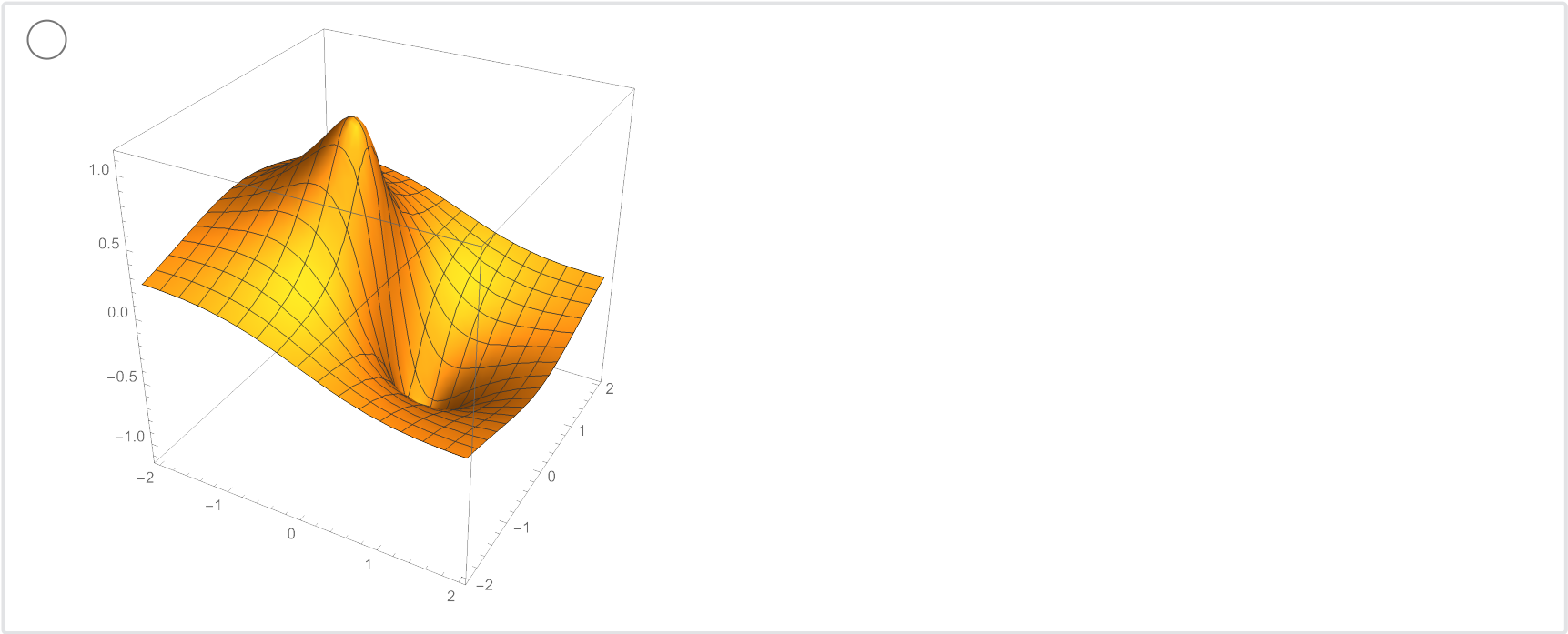
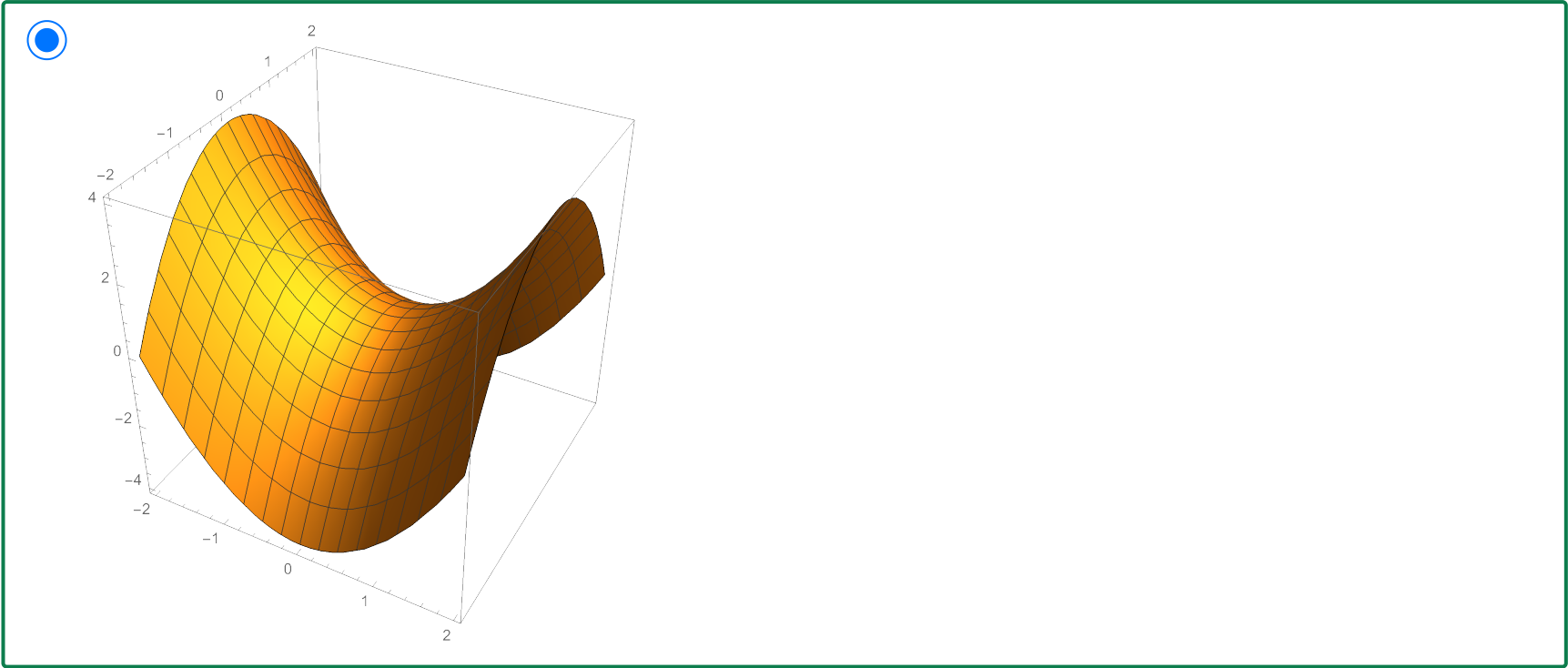
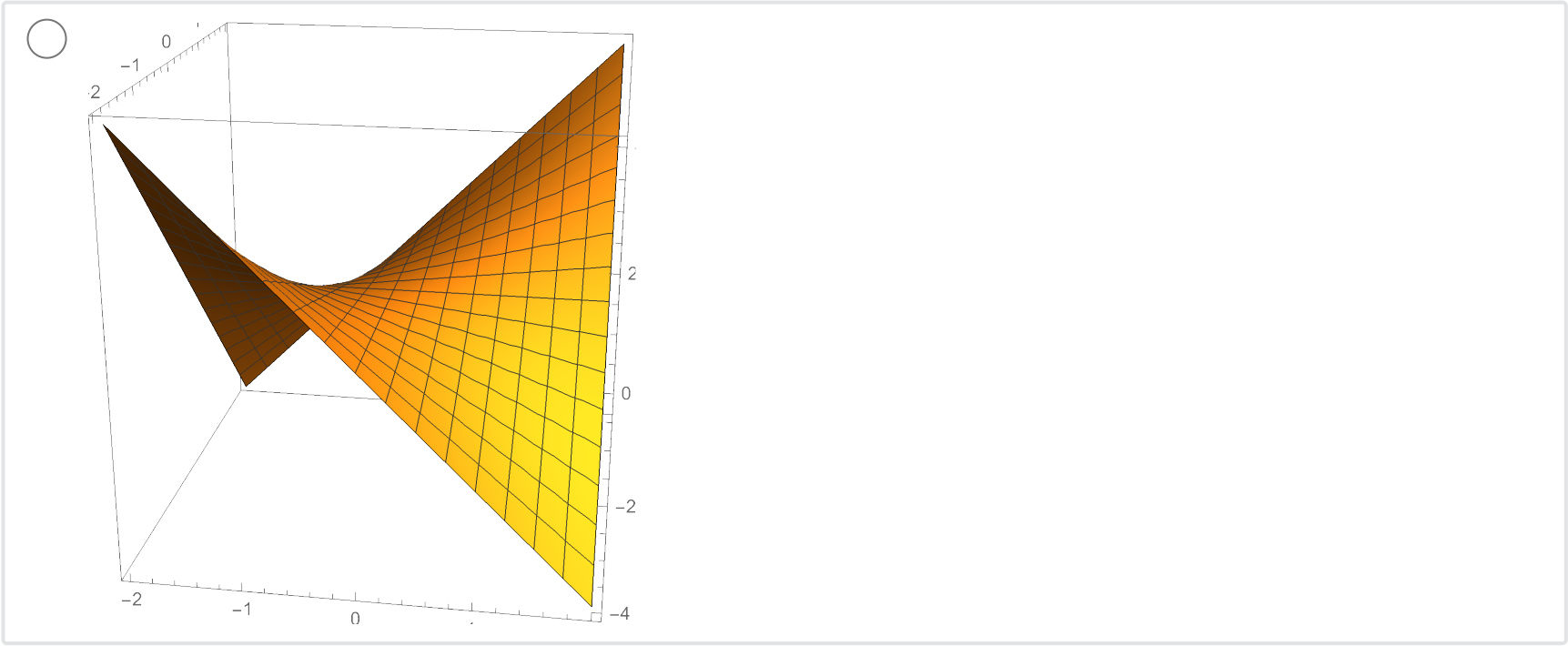
Submit

You have used 5 of 10 attempts

i Answers are displayed within the problem

Identify the surface

1/1 point (graded)
Based on your drawings above, identify the shape of the surface.






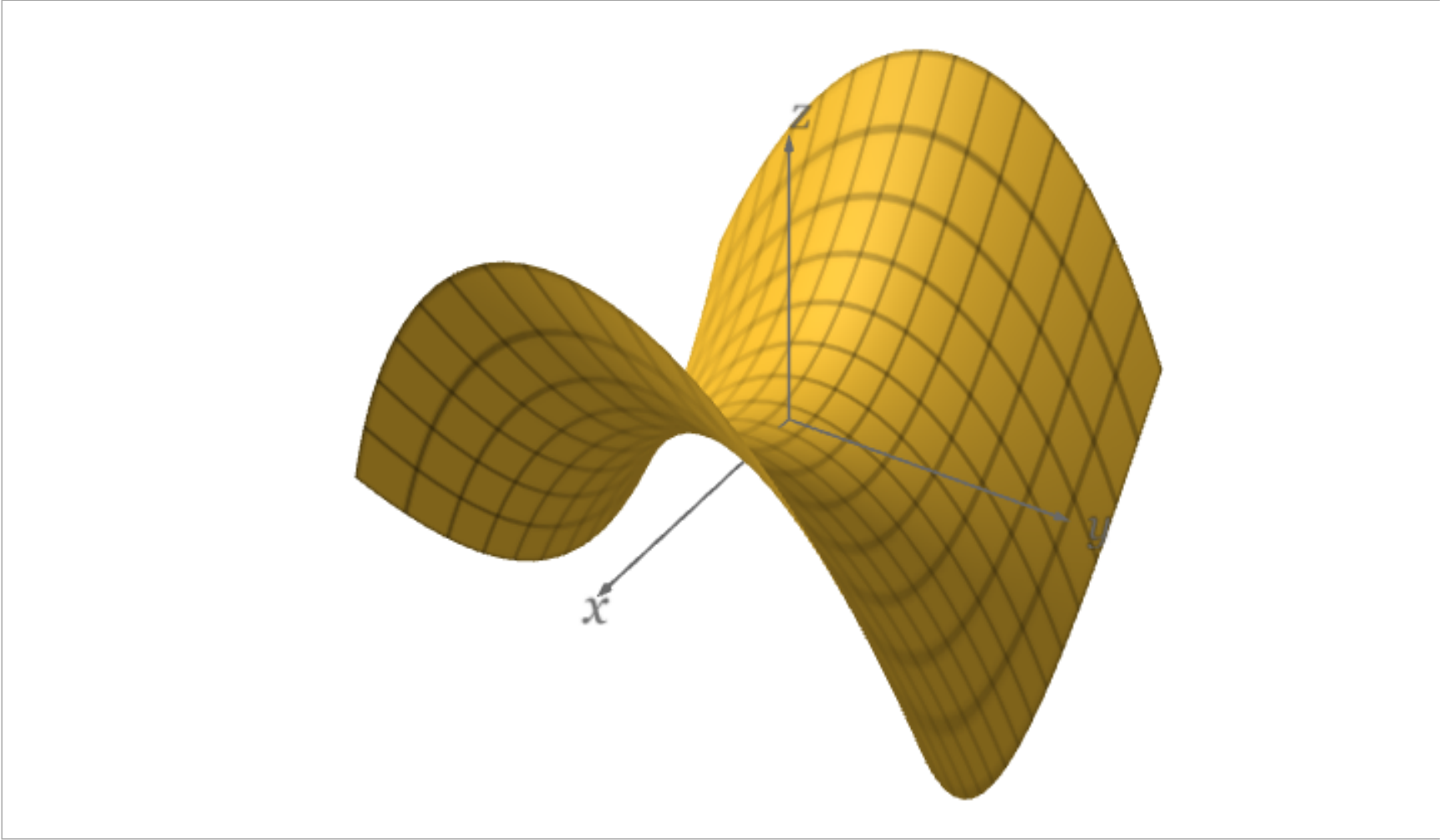
☐ None of the above



Solution:


The surface must be a concave up parabola along the intersection with the xz -plane, and a concave down parabola along the intersection with the yz -plane. The second option is the correct surface.

► The saddle surface 



Submit

You have used 1 of 2 attempts

 Answers are displayed within the problem

7. Scaffolded example


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 [staff] Question 4 - Got correct answer but it says wrong


I got the correct graph according to the solution, but it said I was wrong. Please refer to my previous attempts to see my answers. T...

3


 Input Help Needed

I just maxed out my attempts and was shown the answer, but the answer was something that I put in earlier (Intersection with plane...

3


 Issue with the tool


3


 What axes are shown?


I can clearly see that the z-axis is labeled as the vertical axis on the Intersections with Planes 2, 3, and 4 graphs. However, I cannot...

4

 Got stuck here, any help / intuition will be appreciated

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6/8



[Staff] Identify the surface - incorrect plot in Solution

4

I believe an incorrect surface is shown in the Solution to *Identify the surface*, in the interactive plot. If needed, I can give my reason...

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