

1. Consider the surface $-x^2 - y^2 + z^2 = 1$

- (a) Sketch the traces in the yz -plane, the xy -plane, and the planes $z = \pm 1$, $z = \pm 5$.
- (b) Use your traces to sketch a graph of the surface.
- (c) Check your sketch on Maple. Experiment with the following two ways of displaying this surface:

```
implicitplot3d(-x^2-y^2+z^2=1,x=-2..2, y=-3..3, z=-3..3);
```

and

```
plot3d([sqrt(1+x^2+y^2),-sqrt(1+x^2+y^2)], x=-3..3, y=-3..3);
```

Also, feel free to experiment with making the circular cross-sections of the graph more apparent by adjusting the z -range: right-click on the graph, then select -axes - range - and then play around with the interval for z .

This surface a *hyperboloid of two sheets*.

2. Consider the surface $z = x^2 - y^2$.

- (a) Sketch the traces in the yz -plane, the xz -plane, the xy -plane and the planes $z = \pm 1$, $z = \pm 2$.
- (b) Use your traces to sketch a graph of the surface.
- (c) Check your sketch on Maple. Again, experiment with `implicitplot3d` versus `plot3d`.

This is a *hyperbolic paraboloid*.