Math 13 Fall 2004
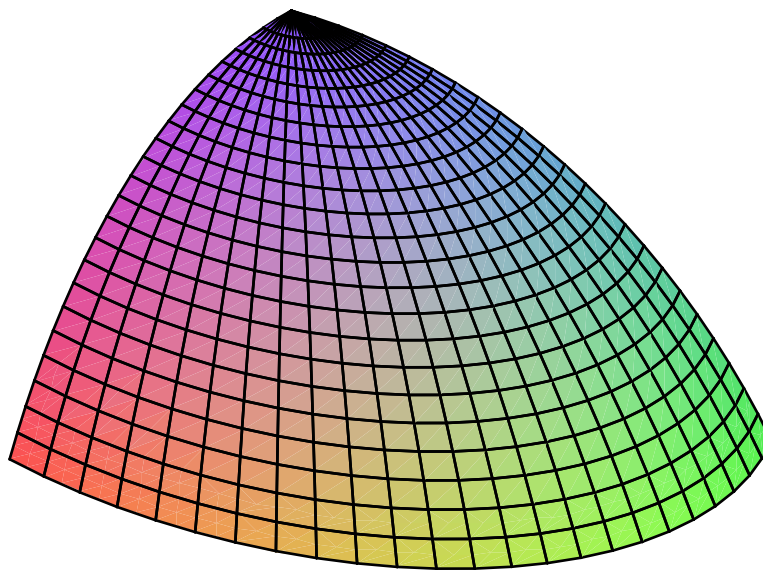## Calculus of Vector–valued Functions

Examples of Parametrized Surfaces
November 16, 2004

Define a parametrized surface in the space

```
> X := (s, t) -> [2 * cos(s) * sin(t), 2 * sin(s) * sin(t), 2 * cos(t)];
```
$$X := (s, t) \rightarrow [2\,\cos(s)\,\sin(t),\, 2\,\sin(s)\,\sin(t),\, 2\,\cos(t)]$$
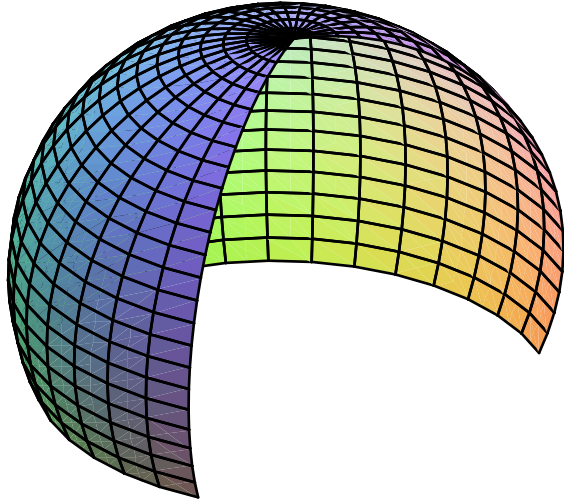
Let's render it with parameters taking values in some rectangle.

Looks like a slice of a sphere!

```
> plot3d(X(s,t), s = 0 .. 2, t = 0 .. 1);
```

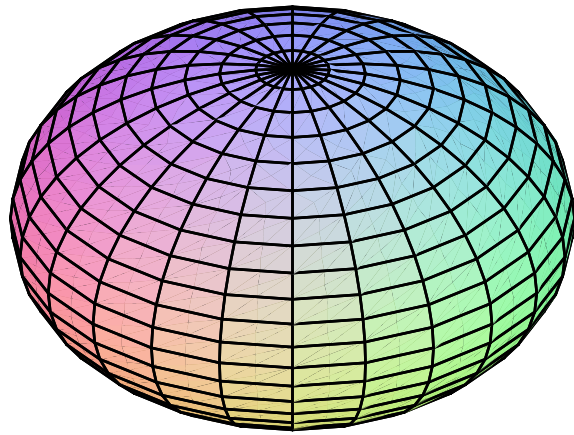**Make the parametrizing rectangle larger . . .**

```
> plot3d(X(s,t), s = 0 .. 4, t = 0 .. 2);
```

. . . and larger. It's indeed a sphere!

Black lines are the coordinate curves. "Meridians" and "latitude circles"
correspond to s and t being constants, respecively.

```
> plot3d(X(s,t), s = 0 .. 2*Pi, t = 0 .. Pi);
```


>