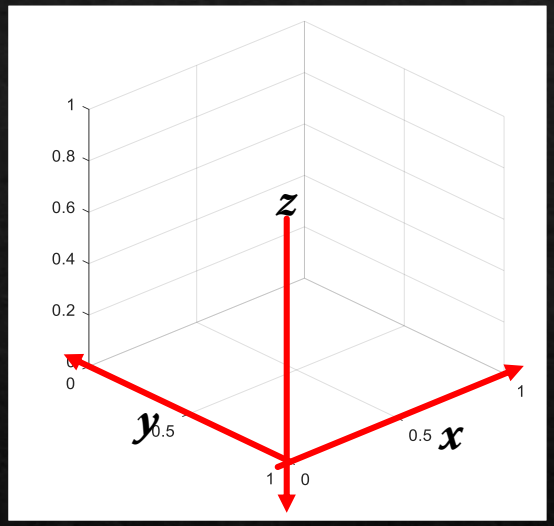
Drawing 3D Objects

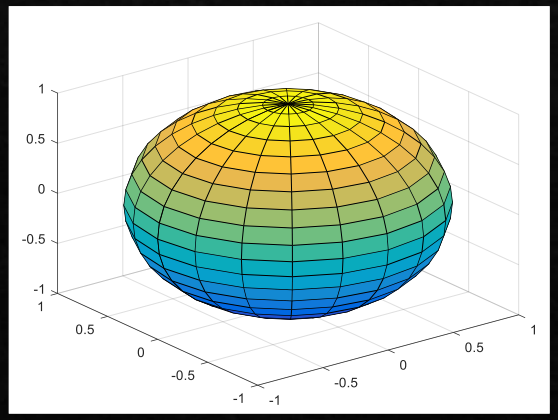
Lab 3

3D primitives

- 3D coordinate system in Matlab

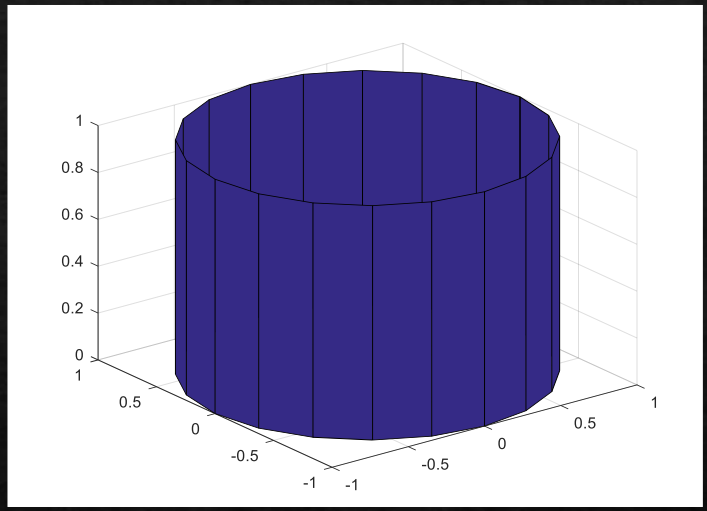


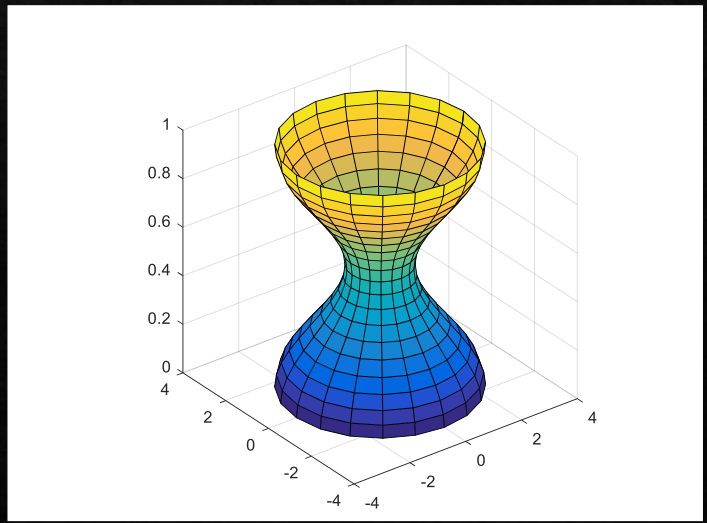
- sphere: generates a sphere consisting of 20-by-20 faces
  - sphere(n) (draws an n-by-n sphere)
  - [x,y,z] = sphere(n) (You draw the sphere with surf(X,Y,Z))
  - See sphereExample.m
- You can also do texture mapping (see drawEarth.m)



3D primitives

- cylinder: generates *x*-, *y*-, and *z*-coordinates of a unit cylinder
  - [X,Y,Z] = cylinder
  - [X,Y,Z] = cylinder(r) returns the x-, y-, and z-coordinates of a cylinder using r to define a profile curve
  - [X,Y,Z] = cylinder(r,n)
  - See cylinderExample.m



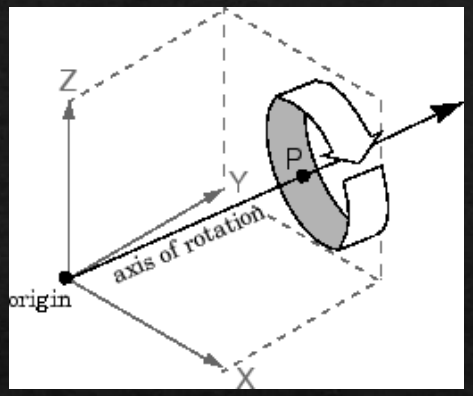


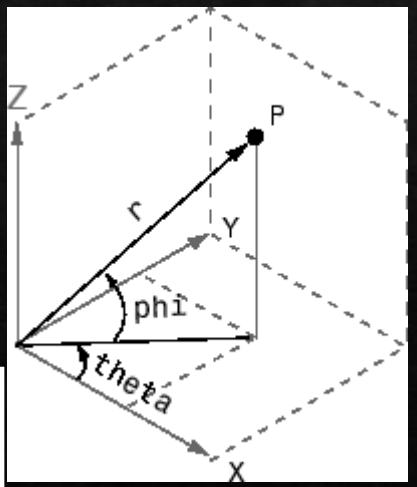
Draw 3D objects

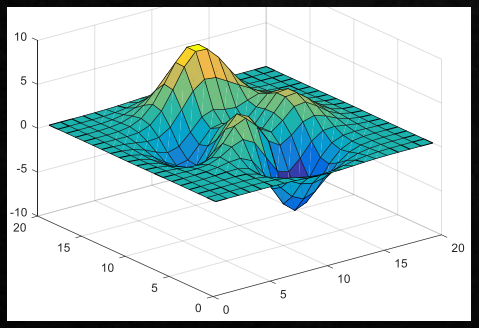
- Cone
  - See cone.m
- Ellipsoid
  - See ellipsoid.m

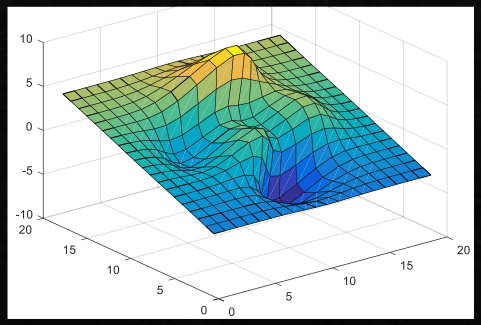
Transformation of 3D object

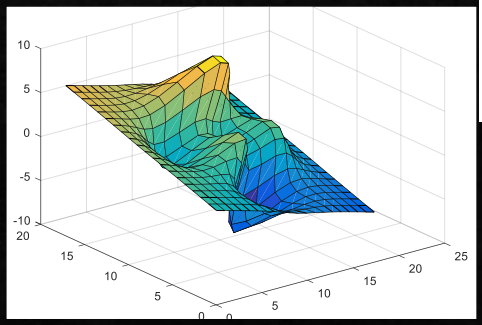
- Translation
  - x->x+a; y->y+b
- Rotation
  - rotation(h,direction,alpha)
  - See rotationExample.m
- Scale
  - x->a*x; y->b*y





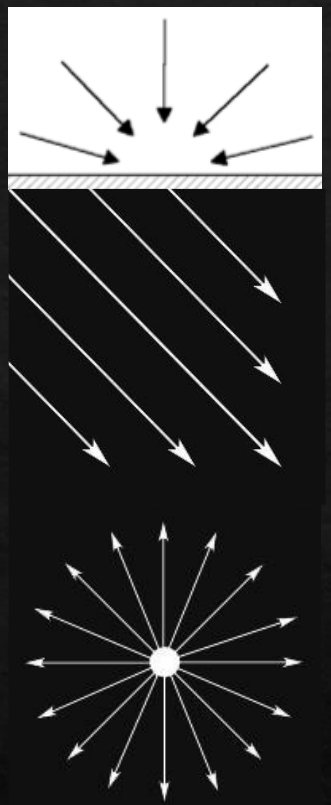


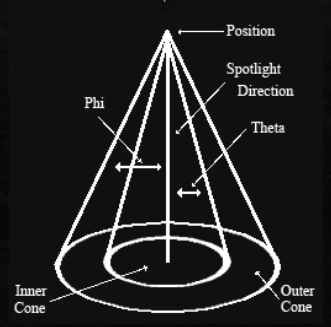


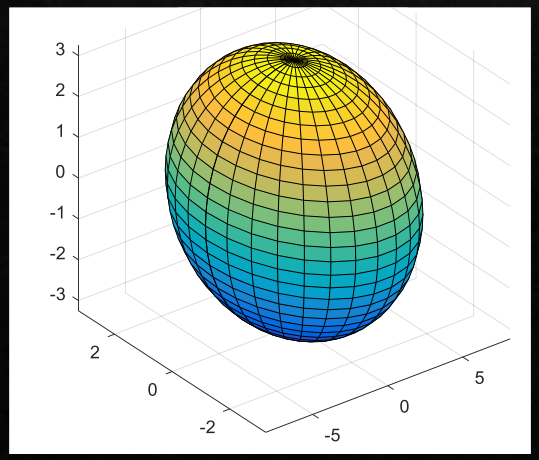


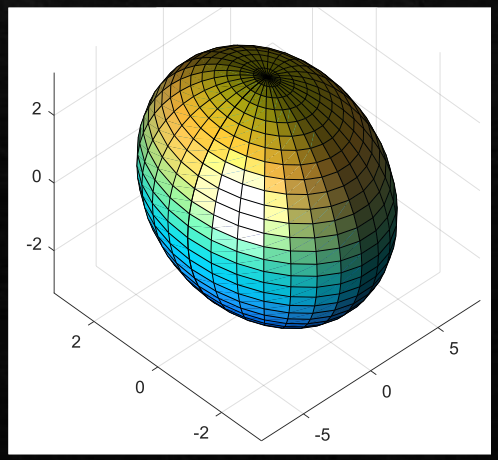
Lights

- light creates a light object in the current axes
  - light('PropertyName',propertyvalue,…)
- Light Properties
  - Color: [1 1 1] (default) | RGB triplet | color string
  - Position: [1 0 1] (default) | three-element vector of the form [x y z]
  - Style: 'infinite' (default) | 'local'



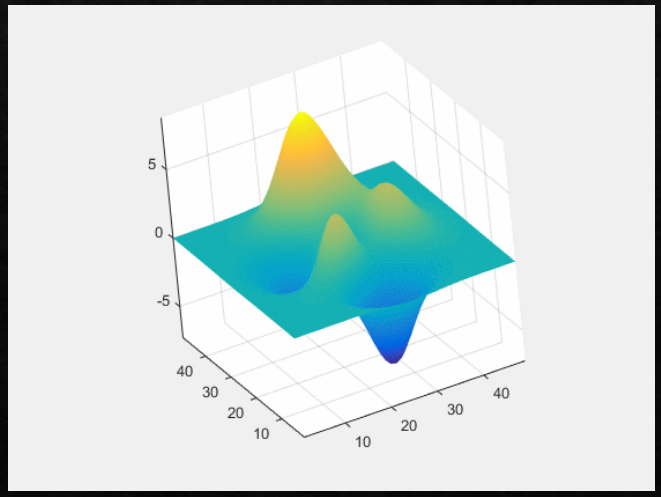






Camera

- camorbit
  - camorbit(dtheta,dphi)
  - camorbit(dtheta,dphi,'coordsys')
  - camorbit(dtheta,dphi,'coordsys','direction')



Exercise

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1. Run previous examples;
2. Finish the following task:
   - Draw a sphere on the screen;
   - The sphere will automatically rotate;
- Submit your work to TA
   - Compress the whole project folder into a zip file ("ID_name_lab3.zip")
   - 1350588-1452737: js_ilab@163.com
   - 1452741-1452844: 0628yulu@tongji.edu.cn