Calc 3 - Maple 1

In class we discussed several Maple commands to visualize functions of two variables, sheets, implicitly defined functions, and vector-valued functions:

```
with(plots)
Loads additional plot commands

plot3d(f(x,y), x=A..B, y=C..D)
Draws a surface in 3D

plot3d(sinh(x)*cos(y), x=-4..4, y=-4..4)

implicitplot3d(f(x,y,z)=c, x=A..B, y=C..D, z=E..F)
Draws an implicitly defined function

plot([x(t), y(t), t=A..B], x=C..D, y=E..F)
Draws a 2D space curve

spacecurve([x(t),y(t),z(t)], t=A..B)
Draws a 3D space curve

tubeplot([x(t),y(t),z(t)], t=A..B)
Draws a tube around a 3D space curve
```

Complete the following assignments in Maple. Save your Maple worksheet or copy-and-paste your graphs into a Word document. Submit the document as an email attachment to me.

1. Use the appropriate plot command to visualize the following functions:
   a) \( f(x,y) = \exp(-x^2-y^2) \)
   b) \( x^2 + z^2 = 4 \)
   c) \( r(t) = \langle \cos(t), \sin(2t) \rangle \)
   d) \( x^3 + y^3 + z^3 + 1 = (x + y + z + 1)^3 \)
   e) \( r(t) = \langle 2 \cos(5t), 5 \sin(7t) \rangle \)
   f) \( f(x,y) = \sin(xy) \)
   g) \( r(t) = \langle -10 \cos(t) - 2 \cos(5t) + 15 \sin(2t), -15 \cos(2t) + 10 \sin(t) - 2 \sin(5t), 10 \cos(3t) \rangle \)
   h) \( \sin(x) \cdot \cos(y) \cdot z = 0.5 \)
   i) \( r(t) = \langle \cos(t), \sin(t), \cos(t) \cdot \sin(t) \rangle \)

   Right-click on your plot to add axes to your picture and rotate it so that the primary features of the graph show up nicely.

2. As a late Valentine’s Day special, draw the 2D space curve
   \[ r(t) = \langle \sin(t) \cdot \cos(t) \cdot \ln(|t|), |t|^{0.3} \cdot (\cos(t))^2 \rangle \]
   as \( t \) goes from -1 to 1.

Bonus: To see what else Maple can do, execute the following command. Do you know the name of the object?

```
plot3d([[4 + x*cos(1/2), y, x*sin(1/2)], x = -\pi..\pi, y = -0.2..0.2])
```