Lagrange Multipliers- HW Problems

Find the absolute maximum and minimum values of the following functions subject to the given constraints.

1. $f(x,y) = y$ subject to $9x^2 + 4y^2 = 36$

2. $f(x,y) = x^3 + y^3$ subject to $x^2 + y^2 \leq 1$

3. $f(x,y) = x^2 + 2y^2$ subject to $x^2 + y^2 = 1$

4. $f(x,y) = x^2 + 2y^2$ subject to $x^2 + y^2 \leq 1$

5. $f(x,y,z) = x + z$ subject to $x^2 + y^2 + 2z^2 = 1$

6. $f(x,y,z) = x^2 + y^2 + z^2$

   subject to $(x-1)^2 + (y-2)^2 + (z+2)^2 \leq 36$.

7. A rectangular box without a top is to be made from $24\ ft^2$ of material. Find the maximum volume of the box.