Extrema of Functions of 2 Variables- HW Problems

Find the critical points for the following functions.

1. $g(x,y) = -x^2 + y^2 + xy$
2. $f(x,y) = 2x^3 - 6xy + y^2$
3. $h(x,y) = x^2y - xy^2 - x + y$
4. $f(x,y) = -x^3 - y^2 + 2xy + 3$

Find all local maxima, minima, and saddle points for the following functions.

5. $f(x,y) = 2x^3 - 6xy + y^2$
6. $g(x,y) = 2y^3 - 6xy + 3x^2$

7. Find the points on the surface $y^2 = xz + 9$ that are closest to the origin.

8. A rectangular box has a volume of $64m^3$. Find the dimensions of the box with minimum surface area.

Find the absolute maximum and minimum values of the function f on the given set.

9. $f(x,y) = x^2 - 2xy + 2x + 1$

   on $D = \{(x,y) |\ 0 \le x \le 2,\ 0 \le y \le 3\}$.

10. $f(x,y) = xy$ on $D = \{(x,y) |\ x^2 + y^2 \le 1\}$.

11. Find 3 positive numbers whose sum is 24 and the sum of the squares is as small as possible.