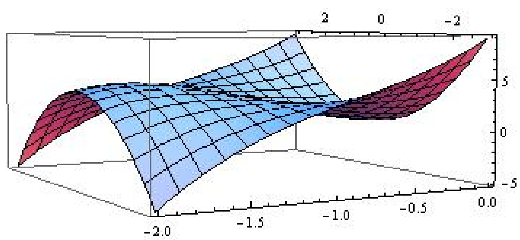
1. Find the local maximum and minimum values and saddle point(s) of the function.

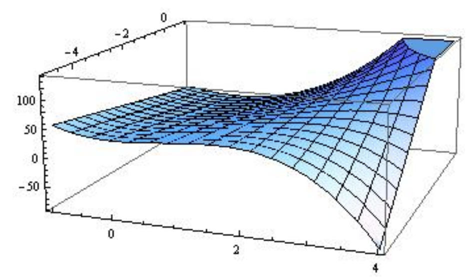
a) $f(x, y) = 2x^3 + xy^2 + 5x^2 + y^2$

A. f has a local maximum $\frac{125}{27}$ at $(-\frac{5}{3}, 0)$ and a local minimum 0 at $(0, 0)$. $(-1, 2)$ and $(-1, -2)$ are saddle points.

b) $f(x, y) = x^3y + 12x^2 - 8y$

A. $(2, -4)$ is a saddle point.





2. Find the point on the plane $x + 2y + z = 4$ that is closest to the point $(1, 0, -2)$.

A. $(\frac{11}{6}, \frac{5}{3}, -\frac{7}{6})$

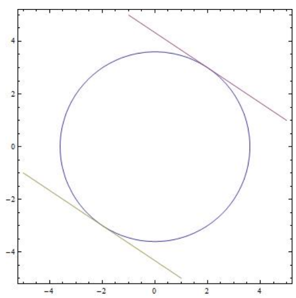
3. Find the absolute maximum and minimum values of f on the set D.

$$f(x, y) = xy^2, \qquad D = \{(x, y) : x \geq 0, y \geq 0, x^2 + y^2 \leq 3\}$$

A. The absolute maximum is $f(1, \sqrt{2}) = 2$ and the absolute minimum is $f(0, 0) = 0$

4. Use Lagrange multipliers to find the maximum and minimum values of the function subject to the given constraint(s).

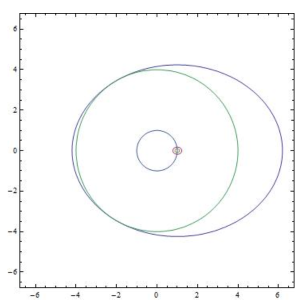
$$f(x,y) = 4x + 6y;\ x^2 + y^2 = 13$$



A. Max : 26, Min : -26

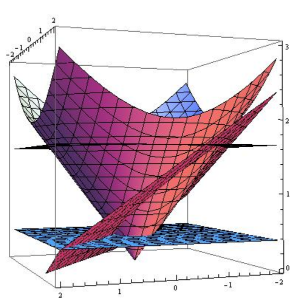
5. Find the extreme values of f on the region described by the inequality.

$$f(x,y) = 2x^2 + 3y^2 - 4x - 5, \qquad x^2 + y^2 \leq 16$$



A. Max : 47, Min : -7

6. The plane $4x - 3y + 8z = 5$ intersects the cone $z^2 = x^2 + y^2$ in an ellipse. Use Lagrange multipliers to find the highest and lowest points on the ellipse.



A. The highest point : $(-\frac{4}{3}, 1, \frac{5}{3})$, The lowest point : $(\frac{4}{13}, -\frac{3}{13}, \frac{5}{13})$

Course Homework due Mar 12, Wed.

Mar 3, Mon. : **14.7** 1, 3, 5, 7, 9, 11, 29, 31, 39
Mar 5, Wed. : **14.8** 3, 5, 7, 9, 11, 15, 19, 25, 41
Mar 7, Fri. : **15.1** 11, 31. **15.2** 3, 5, 7, 9, 15, 17, 27, 31