

## Problem Set 7

For help visualizing three-dimensional functions and their level curves, you might try using Tom Banchoff's [Level Curve applet](http://www.slu.edu/classes/maymk/banchoff/LevelCurve.html) (<http://www.slu.edu/classes/maymk/banchoff/LevelCurve.html>) or a similar tool of your choice.

1. Problem 18.1. At each of the critical points, find the gradient of  $f$  and the gradient of  $g$ , the constraint. Plot these vectors on your graph.
2. Problem 18.3.
3. Problem 18.4.
4. Problem 18.5.
5. Problem 18.6.
6. Problem 18.9. To clarify, note that this problem is in two parts. In the first part, you solve a constrained maximization problem, and you find the maximum value attained by the objective function at the optimum. In the second part, you show that the result of the maximization implies an interesting and intuitive mathematical result: that the geometric mean of three numbers is always less than or equal to the arithmetic mean of those three numbers.
7. Problem 18.10.
8. Problem 18.12.
9. Problem 18.13.
10. Problem 18.14.
11. Problem 18.15.
12. Problem 18.17.
13. Problem 18.18.