MATH 249

Today

1. 14.8 Lagrange Multipliers (Understand the method of Lagrange Multipliers for constrained optimization problems)

2. WeBWorK

14.8 Lagrange Multipliers

1. Given a function f of two variables, we seek to optimize f subject to a constraint of the form $C : g(x, y) = k$ (f is forced to lie on a path C).

2. Note that $g(x, y) = k$ is a level curve of g.

3. We seek the greatest value of c such that $g(x, y) = k$ meets $f(x, y) = c$.

4. At each point, if C is passing **through** a level curve of f, then we can pass to a higher value of f.

5. This ceases to be possible when C is tangent to a level curve of f – that is, when the tangents to C and the level curve of f are parallel.

6. This happens when the normals to the curves are parallel, too.

7. Accordingly: we seek points at which $\nabla g || \nabla f$.

8. That is: we seek λ such that $\nabla f = \lambda \nabla g$.

9. Examples p. 940: #7, 9, 6

Next Time

1. Optimization summary