Homework 8
(due Friday, October 31)

Warmup (don't turn in).

3.4: 1a, 2b, 3 (this is a rather nice test of your understanding of gradients), 4
3.5: 7ac, 8ab
3.6: 2ad, 3b

Turn in answers only.

3.4: 1bc, 2ac

3.5: 7bd, 8c

Turn in full solutions.

3.4: 8 (take the focus to be $(0, 1)$ and the directrix to be $x_2 = -1$), 12

3.5: 1, 2, 6, (you may take for granted the product rule $(f \cdot g)' = f' \cdot g + g' \cdot f$ for C^1 curves $f, g : (a, b) \to \mathbf{R}^n$), ~~10~~.

pre 3.6/7: Suppose that $f : \mathbf{R}^n \to \mathbf{R}$ and $g : \mathbf{R}^p \to \mathbf{R}^n$ are differentiable functions, and let $F = f \circ g$. Show that

$$\frac{\partial F}{\partial x_j}(a) = \sum_{i=1}^{n} \frac{\partial f}{\partial y_i}(g(a)) \frac{\partial g_i}{\partial x_j}(a),$$

where $y_i = g_i(x)$ is the ith component of g. This could be useful in 3.6/7

3.6: 2b, 3a, 7

Extra Credit: 3.5.15