Extra exercise for Adams 16.7:

Let $f(x, y, z) = x^2 + y^2 + x$.

(a) Compute the gradient of f in rectangular coordinates.

(b) Convert f to cylindrical coordinates and compute the gradient of f in cylindrical coordinates. Then convert the gradient to rectangular coordinates and check that your answer agrees with (a).

(c) Just like (b), except do it for spherical coordinates.