

## Homework Assignment for Week 08

1. Section 14.5: Problems 9, 15, 19, 25, 27, 29, 35, 36, 40 (See page 807).
2. Let  $f(x, y) = x^2y/(x^2 + y^2)$  for  $(x, y) \neq (0, 0)$  and  $f(0, 0) = 0$ .
  - (a) Is  $f$  continuous at  $(0, 0)$ ?
  - (b) Do  $f_x$  and  $f_y$  exist at  $(0, 0)$ ?
  - (c) Evaluate the directional derivative of  $f$  at  $(x_0, y_0) = (0, 0)$  in the direction  $(\cos \theta, \sin \theta)$ , i.e.  $df/ds_{(\cos \theta, \sin \theta), (0, 0)}$ , if it exists.
  - (d) Is  $f$  differentiable at  $(0, 0)$ ?