

## MA 224 - Quiz 8 Practice Problems

Feel free to work on these with classmates. These are just practice problems to help you gauge how comfortable you are with the material—completely optional. The quiz will not be this long.

Note that this doesn't necessarily cover all the topics that the quiz can cover: it is intended to be just a review of a couple key things.

1. Find and classify all critical points of  $f(x, y) = x^2 - 6xy - 2y^3$ .
2. Find and classify all critical points of  $g(s, t) = 2s^3 + t^3 + 3s^2 - 3t - 12s - 4$ .
3. Mops-R-Us produces  $x$  cheap mops, and  $y$  expensive mops. All the units can be sold for  $p = 20 - 5x$  and  $q = 4 - 2y$ . The total cost of producing all units is given by the joint cost function  $C(x, y) = 2xy + 4$ . What should  $x$  and  $y$  be to maximize profit?

## Answers

Keep in mind there are other CORRECT ways to express these answers, but the answers I provide are likely to be the way the answers would appear on an exam.

1. The function  $f$  has a relative min at  $(-9, -3)$  and a saddle point at  $(0, 0)$ .
2. The function  $g$  has a relative min at  $(1, 1)$ , a relative max at  $(-2, -1)$ , and saddle points at  $(-2, 1)$  and  $(1, -1)$ .
3.  $(2, 0)$  is a relative maximum, so Mops-R-Us should sell 2 cheap mops and no expensive mops to maximize profit.