

# Second Derivative Test.

Fall 2015

Attendance Quizzes

October 12, 2015

## Practice Quiz 7 Second Derivative Test.

Consider the function  $f(x, y) = 4x^2 + axy + y^2 - x^3$  where  $a$  is a constant. Answer the following.

- 1 Check that  $(0, 0)$  is a critical point for  $f(x, y)$ . **Answer:** Check that  $f_x(0, 0) = f_y(0, 0) = 0$ .
- 2 Calculate the test constant  $D = f_{xx}f_{yy} - f_{xy}^2$  at  $(0, 0)$ . Use it to determine all values of  $a$  for which the function has a local max. or min. (extremum) at  $(0, 0)$ .  
**Answer:**  $D = 4(2) \cdot 1(2) - a^2 = 16 - a^2$ . Thus,  $D > 0$  means  $a \in (-4, 4)$ .
- 3 Determine if the function has a local max. or local min. when  $a$  satisfies the condition to have an extremum.  
**Answer:** Since  $f_{xx}(0, 0) = 8 > 0$ , the points will be local min.