

### Math 152-37, Mr. Church, Homework 5

Due in class on Friday, October 17. Please staple your homework.

You are responsible for all of these problems (including odd-numbered exercises). Starred problems are harder and worth more points.

1. Read “A Summary for Finding All the Extreme Values of a Continuous Function  $f$ ” at the top of page 179.
2. Find the minimum of  $x^3 + y^3$  over all  $x$  and  $y$  such that  $x + y = 16$ . (Note that these numbers  $x$  and  $y$  are allowed to be negative.)
3. Let  $f(x) = Ax^2 + Bx + C$ . In terms of  $A$ ,  $B$ , and  $C$  describe where  $f(x)$  is concave up and where it is concave down.
4. Let  $g(x) = x + \frac{1}{x}$ . Describe where  $g(x)$  is concave up and where it is concave down.
5. (★) Find the point on the parabola  $y = x^2$  which is closest to the point  $p = (3, 0)$ . (Remember that the distance between two points  $p = (x_1, y_1)$  and  $q = (x_2, y_2)$  is given by the Pythagorean formula  $\text{dist}(p, q) = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ .)
6. (★) Exercise 4.1.29.