

## Quiz #11

**Answer the sub questions to answer the following:**

Find the absolute maximum and absolute minimum values of  $z$  on  $D$  where  $z = f(x, y) = 2x^3 + y^4$  and  $D = \{(x, y) | x^2 + y^2 \leq 1\}$ .  $D$  is the boundary and interior of the unit circle.

1. Sketch  $D$ . What is the equation of the boundary of  $D$ ?
2. Find the critical points of  $f$ .
3. Input the critical points into  $f$ .
4. Now it is time to input the boundary into  $f$ . The goal is to eliminate one of the variables of  $f$ . The easiest way is to do this is to isolate  $y^2$  in the boundary equation and input this into  $f$ . Do this. Write down your new function that is just in terms of  $x$ . Even though we have eliminated the  $y$ s from  $f$ , we will still refer to this function as  $f$ .

5. Now we need to maximize and minimize  $f$  using Calculus I. First, what are the critical points of  $f$ ?
6. Input the critical points into  $f$ . Record the  $z$ -values and the  $(x, y)$  locations.
7. Now we have to think about the boundary in terms of  $x$ . What is the largest and smallest  $x$ -values we can input into  $x$ ?
8. Lastly, input the boundary points in terms of  $x$  into  $f$ . Record the  $z$ -values and their locations.
9. Now, compare all of your  $z$ -values. Give the absolute max and its location(s). Give the absolute min and its location(s).