Preface

Here are a set of problems for my Calculus I notes. These problems do not have any solutions available on this site. These are intended mostly for instructors who might want a set of problems to assign for turning in. I try to put up both practice problems (with solutions available) and these problems at the same time so that both will be available to anyone who wishes to use them.

As with the set of practice problems I write these as I get the time and some sections will have only a few problems at this point and others won’t have any problems in them yet. Rest assured that I’m always trying to get more problems written but this site has been written and maintained in my spare time and so I usually cannot devote as much time as I’d like to the site.

Differentials

For problems 1 – 5 compute the differential of the given function.

1. \( f(x) = 3x^6 - 8x^3 + x^2 - 9x - 4 \)

2. \( u = t^2 \cos(2t) \)

3. \( y = e^{\cos(z)} \)

4. \( g(z) = \sin(3z) - \cos(1-z) \)

5. \( R(x) = 4\sqrt{6x + e^{-x}} \)

5. Compute \( dy \) and \( \Delta y \) for \( y = \sin(x) \) as \( x \) changes from 6 radians to 6.05 radians.

6. Compute \( dy \) and \( \Delta y \) for \( y = \ln(x^2 + 1) \) as \( x \) changes from -2 to -2.1.

7. Compute \( dy \) and \( \Delta y \) for \( y = \frac{1}{x^2 - 2} \) as \( x \) changes from 3 to 3.02.

8. Compute \( dy \) and \( \Delta y \) for \( y = x e^{\frac{1}{x}} \) as \( x \) changes from -10 to -9.99.
9. The sides of a cube are found to be 6 feet in length with a possible error of no more than 1.5 inches. What is the maximum possible error in the surface area of the cube if we use this value of the length of the side to compute the surface area?

10. The radius of a circle is found to be 7 cm in length with a possible error of no more than 0.04 cm. What is the maximum possible error in the area of the circle if we use this value of the radius to compute the area?

11. The radius of a sphere is found to be 22 cm in length with a possible error of no more than 0.07 cm. What is the maximum possible error in the volume of the sphere if we use this value of the radius to compute the volume?

12. The radius of a sphere is found to be ½ foot in length with a possible error of no more than 0.03 inches. What is the maximum possible error in the surface area of the sphere if we use this value of the radius to compute the surface area?