

Math 3A Midterm #2 practice problems

1. The volume of sphere is given by

$$V(r) = \frac{4}{3}\pi r^3$$

Express the rate of change of the volume in terms of the rate of change of the radius.

2. Suppose we measure x to be 20, with an accuracy of 2%. What is the accuracy of the calculation of f , if f is given by $f(x) = \ln x$.

3. Compute the derivative of each of the following functions:

a.

$$f(x) = 2^{x^3}$$

b.

$$f(x) = \log_{10}(e^x + 1)$$

c.

$$f(x) = x^{3x+1}$$

d.

$$f(x) = \frac{3x^2 + 2}{x - 3}$$

4. Find the linear approximation of $f(x) = \sqrt{x}$ at $x = 1$.

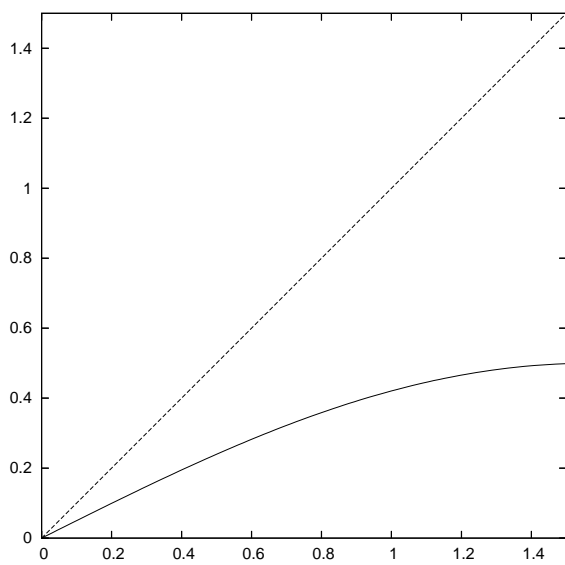
5. Sketch the graph of $y = \sin(x)$ on the domain $[0, 2\pi]$ and determine where the function is increasing, decreasing, concave up, and concave down.

6. Let $f(x) = \frac{4}{3x^2}$.

a. Differentiate $f(x)$ using the quotient rule.

b. Differentiate $f(x)$ using the power rule.

7. Below is a plot of $f(x) = \frac{1}{2}\sin(x)$.



a. On the above plot, draw the graph of $f^{-1}(x)$.

b. Compute $f'(\frac{\pi}{4})$.

c. Compute the derivative of $f^{-1}(x)$ at $x = \frac{1}{2\sqrt{2}}$.