

Math 131H: Midterm 2 practice problems

1. If you need to practice your *chain rule* and your *implicit differentiation* look for example at Reviews problems 11, 13, 15, 25, 29, 33, 36 on page 262.

2. Use *logarithmic differentiation* to compute the derivative of the function

$$f(x) = \frac{\sqrt[5]{2x+1}(x^2-1)^5}{(x+4)^6}$$

3. Review problem 53, , p. 262

4. Review problem 66, p.262

5. Differentiate the functions

$$f(t) = 7^{3t^2}$$

and

$$g(x) = \log_{10}(\sin(x))$$

6. Review problem 89, p. 263

7. Review problem 90, p. 263

8. Review problem 93, p. 263

9. Review problem 94, p. 263

10. Review problem 96, p. 263

11. Review problem 97, p. 263

12. Review problem 98, p. 264

13. Review problem 99, p. 264

14. Review problem 100, p.264

15. (a) If \$2000 is borrowed at %6 percent interest, find the amount money due after 3 years if the interests is compounded (i) yearly, (ii) monthly, (iii) continuously.

(b) If the interests on the \$2000 borrowed in (a) are compounded continuously how long will it take for the your debt to double.

16. Review problem 105, p. 264

17. Using a suitable linear approximation given an approximation of

$$(a) \sqrt[3]{27.5}, \quad (b) \frac{1}{104}, \quad (c) \tan(44^\circ)$$

18. A ferris wheel with a radius of 10m is rotating at a rate of one revolution every two minutes. How fast is a rider rising when his seat is 16m above ground level?

19. The circumference of a sphere was measured to be 48cm with an error of .2 cm. Use differentials to estimate the *maximum error* and the *relative error* for the surface area and the volume of the sphere.

20. Review problem 15, p. 348.

20. Find the local and absolute extrema (i.e., local and global maxima and minima) for the following functions on the given intervals

$$f(x) = x\sqrt{1-x}, \quad [-1, 1]$$

$$f(x) = \frac{3x-4}{x^2+1}, \quad [-2, 2]$$

$$\frac{\ln(x)}{x^2}, \quad [1, 3]$$

21. For the following functions

1. Find the horizontal and vertical asymptotes
2. Find the local maxima and minima.
3. Find the interval where the function is increasing/decreasing.
4. Find the interval where the function is concave upward/downward
5. Draw a graph indicating all the results obtained 1.-4.

$$f(x) = e^{2x-x^2}$$

$$f(x) = \frac{x^2}{x+8}$$

$$f(x) = \frac{1}{1-x^2}$$

$$f(x) = e^{-1/x^2}$$