Math 17A
Vogler
Discussion Sheet 8

1.) Do detailed graphing (See instruction sheet from class.) for each function

a.) $y = x(x-4)$ on the interval $[0, 5]$
b.) $y = x(x-5)^4$
c.) $f(x) = \dfrac{3x^2}{x-4}$
d.) $f(x) = 4\sqrt{x} - x$

2.) Consider the function $f(x) = 1 - x^{2/3}$ on the interval [-1, 1] . Show that $f(1) = f(-1) = 0$ but that $f'(x)$ is never zero on the interval [-1, 1]. Explain how this is possible, in view of the Mean Value Theorem.

3.) Let $f(x) = \begin{cases} -x^2 , & \text{if } -1 \le x \le 0 \\ x^2(x-1) , & \text{if } 0 < x \le 2 . \end{cases}$

a.) Sketch the graph of f .

b.) Show that f satisfies the conditions of the Mean Value Theorem (MVT) over the interval [-1, 2], including special attention at $x = 0$, and determine all values of c guaranteed by the MVT.

4.) Use a linearization to estimate the value of

a.) $\sqrt{150}$ b.) $e^{0.1}$

5.) The radius of a circle is measured with absolute percentage error of at most 3%. Use differentials to estimate the maximum absolute percentage error in computing the circle's

a.) circumference. b.) area.

(RECALL: For a circle : circumference $C = 2\pi r$ and area $A = \pi r^2$.)

6.) The radius of a sphere is measured with absolute percentage error of at most 4%. Use differentials to estimate the maximum absolute percentage error in computing the sphere's

a.) surface area. b.) volume.

(RECALL: For a sphere : surface area $S = 4\pi r^2$ and volume $V = (4/3)\pi r^3$.)

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The following problem is for recreational purposes only.

7.) Find a hidden pattern and determine the next number in the sequence :

$0, 1, 3, 7, 14, 25, 41, 63, \cdots$

Thanks to Dr. Kouba