

Math 1A Worksheet 25

April 15th, 2008

1. Use Newton's Method to approximate the positive solution of $2 \cos(x) = x^4$ correct to 4 decimal places.
2. Consider the function

$$f(x) = \begin{cases} \sqrt{x}, & x \geq 0 \\ -\sqrt{-x} & x < 0. \end{cases}$$

Show that no matter what initial approximation $x_1 \neq 0$ you pick, Newton's method will fail to find the root of f .

3. (Repeat from last time) Find a function f such that $f'(x) = x^3$ and the line $x + y = 0$ is tangent to the graph of f .
4. (Repeat from last time) Find all functions $f(x)$ with $f''(x) = e^x$.
5. Suppose that a_1, a_2, \dots, a_n are real numbers such that

$$a_1 + \frac{a_2}{2} + \frac{a_3}{3} + \dots + \frac{a_n}{n} = 0.$$

Show that

$$f(x) = a_1 + a_2x + a_3x^2 + \dots + a_nx^{n-1}$$

has a root. [Hint: think about an antiderivative for $f(x)$.]

6. Find the absolute maximum of $(1-x^2)(\cos x)$ for x in $[-100001\pi, 100001\pi]$.