Math 10350 Fall 07 – Handout 11
(Sections 3.8 & 3.9)

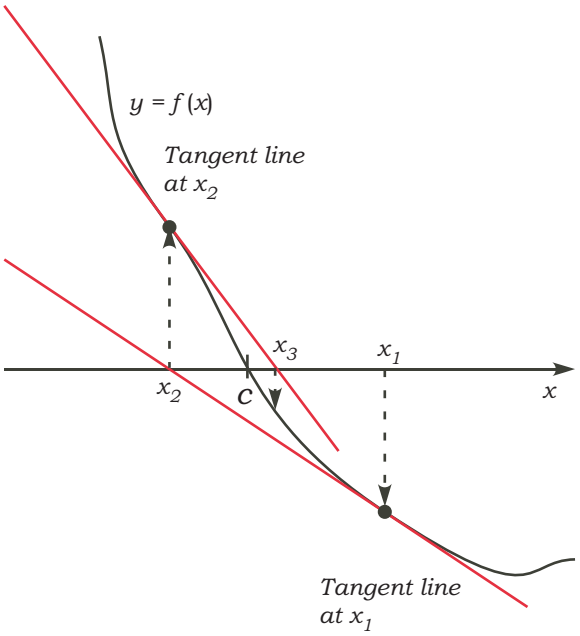
Newton's Method
Steps to applying Newton's method to approximate the solution of $f(x) = 0$:

(1) Make an initial guess x_1 near to the zero you wish to find.

(2) Determine the new approximations x_2, x_3, ... :

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}.$$

(3) Check $|x_n - x_{n+1}| \to 0$ as $n \to \infty$ for convergence to required zero.



1a. Use Intermediate Theorem to show that $f(x) = x^3 + x + 1$ has a zero in the interval $[-1, 0]$. How many zeroes does $f(x)$ have? Hint: $f'(x)$.

1b. Apply Newton's Method with $x_1 = -0.5$ to estimate the zero of $f(x)$ up to three decimal places.

2. Estimate all solutions of $x^2 = \cos x$ up to four decimal places.

3. Find the equation of the tangent line to $f(x) = \sqrt{x}$ at $x = 4$. Use it to estimate the value of $\sqrt{4.5}$. Give an error bound for this estimate?

4. Estimate the value $\cos 59^o$.

5. Given $y = \sec x + x^2$. Find the differential dy and evaluate dy for $x = 0$ and $dx = 0.01$

6. The radius of a circular disk is given as $24cm$ with a maximum error in measurement of $0.2cm$. Use differential to estimate the maximum error in the calculated area of the disk.