習題集 8

(對應 張旭微積分 微分應用篇重點八：牛頓法)

註：此部份作爲牛頓法的練習，若有必要，在計算時可用計算機代替手算。

1. Solve $x^3-25=0$ by Newton Method starting with $x_0=3$ and find x_3 in 3 decimal places.
2. Solve $x^3-4x+1=0$ by Newton Method starting with $x_0=2$ and find x_3 in 3 decimal places.
3. Estimate any of the real root of the equation $x^3+15x^2+12x+20=0$.
4. The concentration C of a chemical in the blood stream t hours after injection into muscle tissue is given by $C=\dfrac{3t^2+t}{50+t^3}$. When is the concentration greatest ?
5. Estimate $\sqrt{7}$ using Newton's Method.
6. Estimate $\sqrt[3]{23}$ using Newton's Method.
7. Solve $x=\tan x$ by Newton Method starting with $x_0=4.5$ and find x_3 in 3 decimal places. [註：若設定其他初始值，可能會導致 x_n 發散的情況！ 可自行嘗試]
8. Solve $\dfrac{x}{x^2+1}=\sqrt{1-x}$ by Newton Method.
9. Solve $e^x=4-x^2$ by Newton Method.
10. Let $A>1$ and $x_0=[\sqrt{A}]+1$. We solve $x^2=A$ by Newton's Method. Show that the accuracy is given by $0<x_n-\sqrt{A}<\dfrac{1}{(2[\sqrt{A}])^{1+2+\ldots+2^{n-1}}}$.