Project 6

Work out a proof of the formula

$$\sin(\beta - \alpha) = \sin(\beta)\cos(\alpha) - \sin(\alpha)\cos(\beta)$$

found in the book.

Project 7

Uppgift GPS:

a. Beskriv den grundlggande matematiken bakom GPS.

b. Ge ngra ytterligare tekniska detaljer (s mycket Du sjlv tycker r rimligt) avseende den tekniska/matematiska realiseringen av GPS.

Anvnd grna Internet fr att f info.

Uppgift Datortomografi:

a. Beskriv den grundlggande matematiken bakom datortomografen.

b. Ge ngra ytterligare tekniska detaljer (s mycket Du sjlv tycker r rimligt) avseende den tekniska/matematiska realiseringen av datortomografi.

Anvnd grna Internet fr att f info.

Project 8

a) Write matlab code that computes Pascals triangle, with first row 1, second row 1 1, third row 1 2 1, forth row 1 3 3 1 etc, where entry j in row i is the sum of entries $j-1$ and j in row $i-1$ if possible, otherwise 1. b) Prove by induction that entry j in row i equals $\frac{i!}{(i-j)!i!}$.

Project 9

An annual interest rate of r percent results after i years in a $(1 + r/100)^i$ doubling of a given investment. a) Explain why! b) Write matlab code that computes the number of years after which a given investment has grown by a factor of 4, for the first time. Hint: Start with $i = 0$ and succesively increase

i by 1 until $(1 + r/100)^i \geq 4$, that is, while $(1 + r/100)^i < 4$. c) Generalize to some case where the interest rate depends on the current capital k, for example as $r = 10(1 + \frac{k}{k+1})$ and some different initial investments.