Matte 3 Oblig 2

Sivert Kindberg

21. februar 2022

Innhold

1 Github

2 Oppgave 3.4.6

Oppgave 3.4.6 utregningene er gjort i Excel
Valgte punkter: (3, 10), (1, 6.5), (-5.9, 7.6), (-3, 5), (-2, 1.7), (-7, 4.3), (6.9, 4.2), (3.8, 5.2)

y = Ax + e

$$\begin{bmatrix}10\\6.5\\7.6\\5\\1.7\\4.3\\4.2\\5.2\end{bmatrix} = \begin{bmatrix}9 & 3 & 1\\1 & 1 & 1\\34.81 & -5.9 & 1\\9 & -3 & 1\\4 & -2 & 1\\49 & 7 & 1\\47.61 & 6.9 & 1\\14.9 & 3.8 & 1\end{bmatrix} \begin{bmatrix}a\\b\end{bmatrix} + \begin{bmatrix}e_1\\e_2\\e_3\\e_4\\e_5\\e_6\\e_7\end{bmatrix}$$

$$B = A^T * A = \begin{bmatrix}9 & 1 & 34.81 & 9 & 4 & 49 & 47.61 & 14.9\\3 & 1 & -5.9 & -3 & -2 & 7 & 6.9 & 3.8\\1 & 1 & 1 & 1 & 1 & 1 & 1 & 1\end{bmatrix} \begin{bmatrix}9 & 3 & 1\\1 & 1 & 1\\34.81 & -5.9 & 1\\9 & -3 & 1\\4 & -2 & 1\\49 & 7 & 1\\47.61 & 6.9 & 1\\14.9 & 3.8 & 1\end{bmatrix} = \begin{bmatrix}6280.4582 & 515.75 & 169.32\\515.75 & 168.86 & 10.8\\169.32 & 10.8 & 8\end{bmatrix}$$

$$C = A^T * y = \begin{bmatrix}9 & 1 & 34.81 & 9 & 4 & 49 & 47.61 & 14.9\\3 & 1 & -5.9 & -3 & -2 & 7 & 6.9 & 3.8\\1 & 1 & 1 & 1 & 1 & 1 & 1 & 1\end{bmatrix} \begin{bmatrix}10\\6.5\\7.6\\5\\1.7\\4.3\\4.2\\5.2\end{bmatrix} = \begin{bmatrix}900.998\\52.1\\44.5\end{bmatrix}$$

$$B^{-1} = \begin{bmatrix}0.000462474 & -0.000860823 & -0.008626157\\-0.000860823 & 0.008084009 & 0.007305914\\-0.008626157 & 0.007305914 & 0.297709637\end{bmatrix}$$

$$x = B^{-1} * c = \begin{bmatrix}6280.4582 & 515.75 & 169.32\\515.75 & 168.86 & 10.8\\169.32 & 10.8 & 8\end{bmatrix} \begin{bmatrix}900.998\\52.1\\44.5\end{bmatrix} = \begin{bmatrix}-0.012024466\\-0.029310073 & 5.856566423\end{bmatrix}$$

$$y = -0.012024466x^2 - 0.029310073x + 5.856566423$$

3 Beregne punkter og lagre i array

Funksjonen tar inn x som verdi og bruker funksjonen fra utergningen og returnerer y verdien punktet skal ha.

Listing 1: trianglesurface.h

```
static float func2(float x) {
       return 0.174 * x + 1, 743;
   }
```

4 3.4.6 Visualisering

VisualPoint klassen tar inn en vector av Vertexer, vertexene blir vist som hvite kvadrater.. MMap får en QuadraticPolynomial som tegner den grønne kurven.

Listing 2: renderwindow.cpp

```
    mMap.insert(std::pair<std::string, VisualObject*>{"QuadtraticPolynomial", new QuadtraticP
    std::vector<Vertex> points;
    points.push_back(Vertex{ 3, 10, 0 });
    points.push_back(Vertex{ 1, 6.5, 0 });
    points.push_back(Vertex{ -5.9, 7.6, 0 });
    points.push_back(Vertex{ -3, 5, 0 });
    points.push_back(Vertex{ -2, 1.7, 0 });
    points.push_back(Vertex{ -7, 4.3, 0 });
    points.push_back(Vertex{ 6.9, 4.2, 0 });
    points.push_back(Vertex{ 3.8, 5.2, 0 });

    for (auto i = 0; i < points.size(); i++)
    {
        mMap.insert(std::pair<std::string, VisualObject*>{ std::to_string(i), new VisualPoint
    }
    }

\centering
\includegraphics[width=\textwidth]{kurve1}
```