Tölvugrafík Heimadæmi 3

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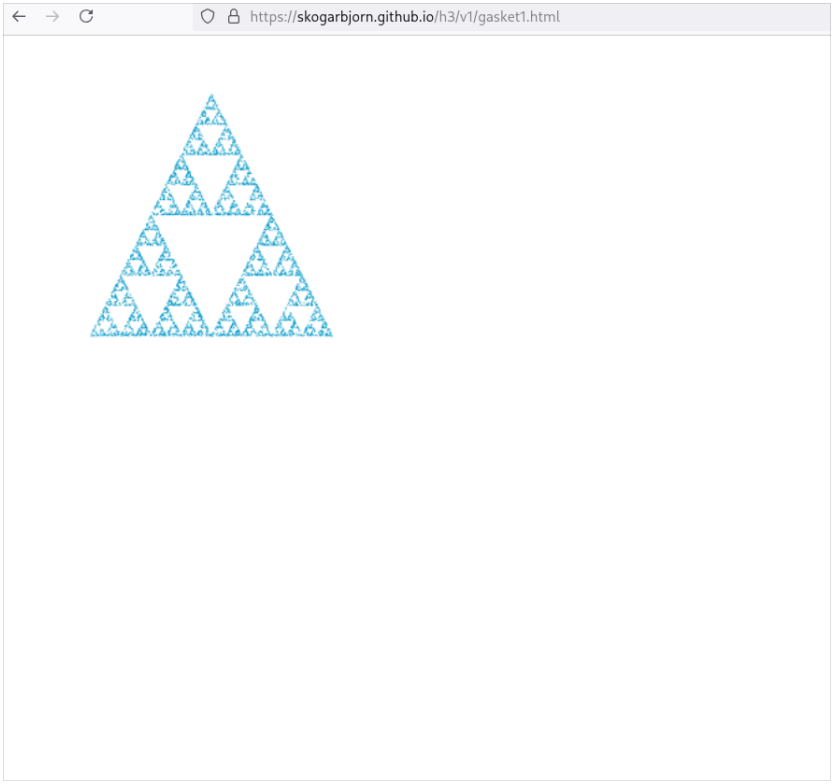
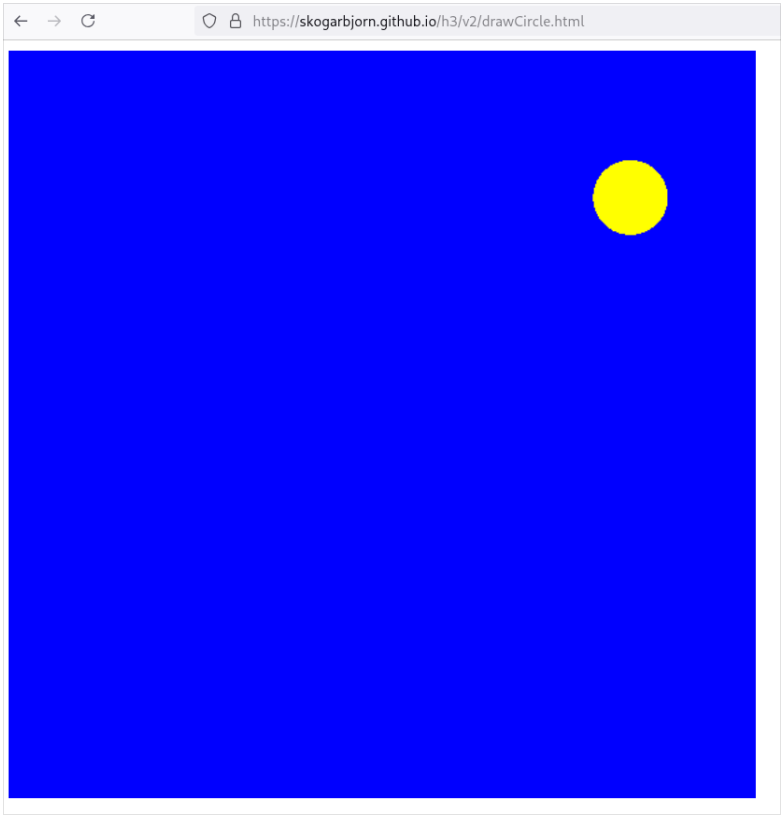
1



`https://skogarbjorn.github.io/h3/v1/gasket1.html`

2



`https://skogarbjorn.github.io/h3/v2/drawCircle.html`

3

a) i) (2,3)

ii) (2,-3)

iii) (2,6)

b) a er 4 þar sem $\frac{4}{-1} = -4$ og b er 2 þar sem $\frac{4}{2} = 2$ og $\frac{-8}{2} = -4$.

4

a) $u = [2, 0]$, $v = [5, 0]$ þar sem við fáum innfeldið

$$\begin{aligned} &\|u\|\|v\|cos\theta \\ &= \sqrt{2^2 + 0^2} \cdot \sqrt{5^2 + 0^2} \cdot cos(0) \\ &= 2 \cdot 5 \cdot 1 \\ &= 10 \end{aligned}$$

b) $u = [2, 0]$, $v = [-5, 0]$ þar sem við fáum innfeldið

$$\begin{aligned}
&\|u\|\|v\|cos\theta \\
&= \sqrt{2^2 + 0^2} \cdot \sqrt{(-5)^2 + 0^2} \cdot cos(180) \\
&= 2 \cdot 5 \cdot -1 \\
&= -10
\end{aligned}$$

c) Við sjáum þá að

$$\begin{aligned}
&(s\mathbf{u}) \cdot \mathbf{v} \\
&= [su_n, su_{n-1}, ..., su_0] \cdot \mathbf{v} \\
&= \sqrt{(su_n)^2 + (su_{n-1})^2 + ... + (su_0)^2}\sqrt{v_m^2 + v_{m-1}^2 + ... + v_0^2} \cdot cos\theta \\
&= \sqrt{s^2u_n^2 + s^2u_{n-1}^2 + ... + s^2u_0^2}\sqrt{v_m^2 + v_{m-1}^2 + ... + v_0^2} \cdot cos\theta \\
&= \sqrt{s^2(u_n^2 + u_{n-1}^2 + ... + s_0^2)}\sqrt{v_m^2 + v_{m-1}^2 + ... + v_0^2} \cdot cos\theta \\
&= s\sqrt{u_n^2 + u_{n-1}^2 + ... + s_0^2}\sqrt{v_m^2 + v_{m-1}^2 + ... + v_0^2} \cdot cos\theta \\
&= s\|\mathbf{u}\|\|\mathbf{v}\|cos\theta \\
&= s(\|\mathbf{u}\|\|\mathbf{v}\|cos\theta) \\
&= s(\mathbf{u} \cdot \mathbf{v})
\end{aligned}$$

5

Algorithm 1 Athugar hvort n punktar liggi í sömu sléttu

Require: $n > 3$ ▷ *points* er af lengd n

```
a ← points_0
b ← points_1
c ← points_2
ab ← b − a
ac ← c − a
V ← ab × ac                          ▷ × er cross product
while i ← 3 is less than n do
    ad ← points_i − a
    if ad · V ≠ 0 then               ▷ · er dot product
        return false
    end if
end while
return true
```