Intro til generativ kunst

Sondre Bakke

Hva er generativ kunst?

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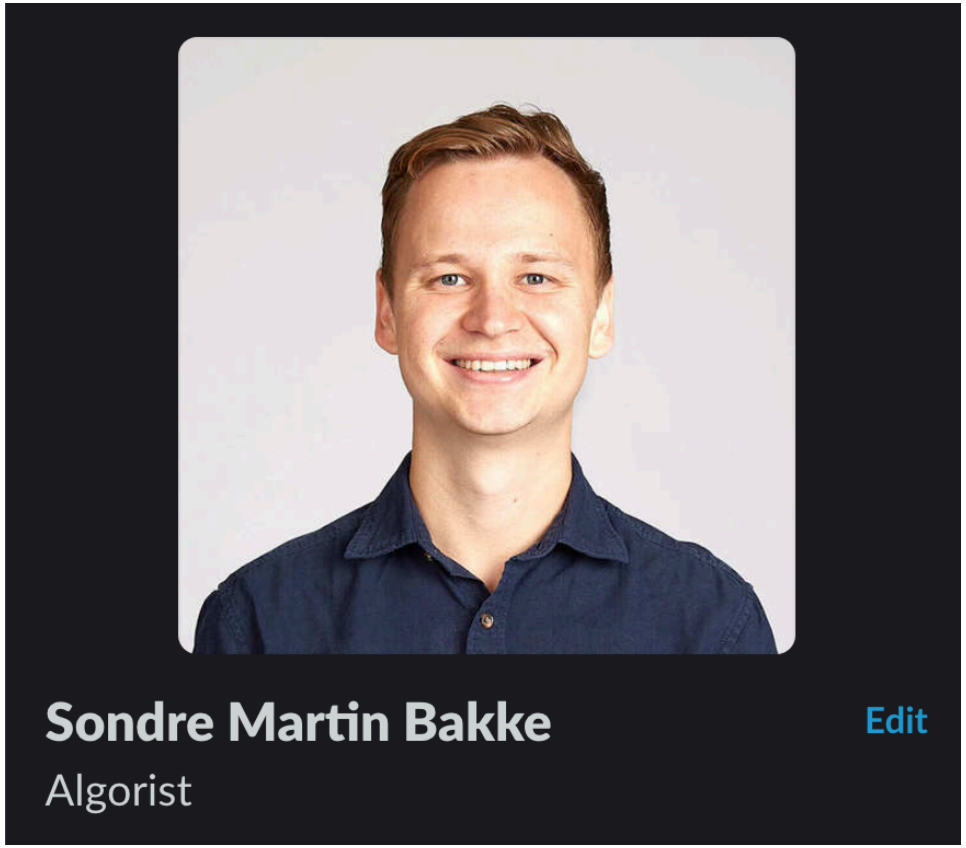

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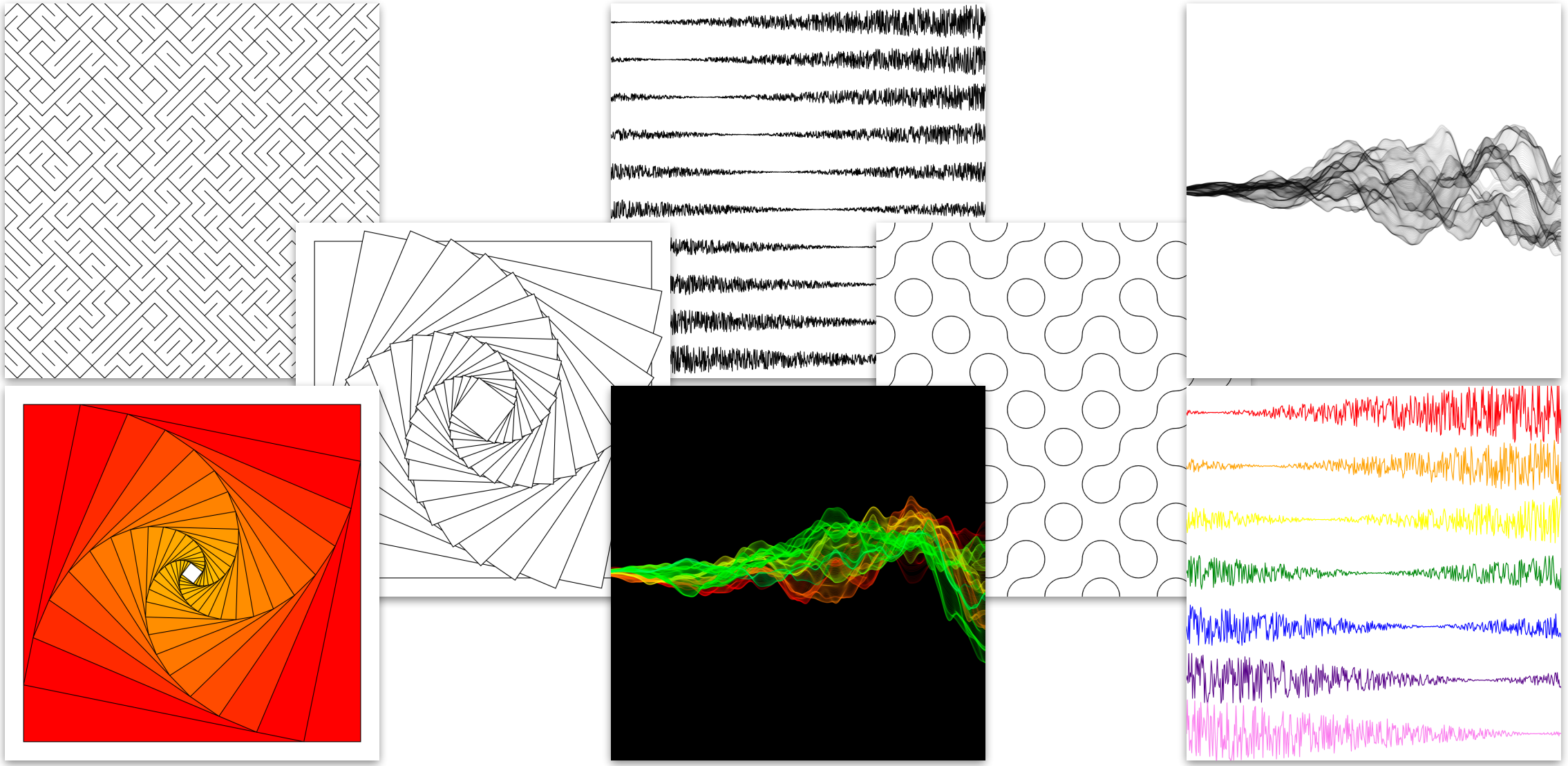
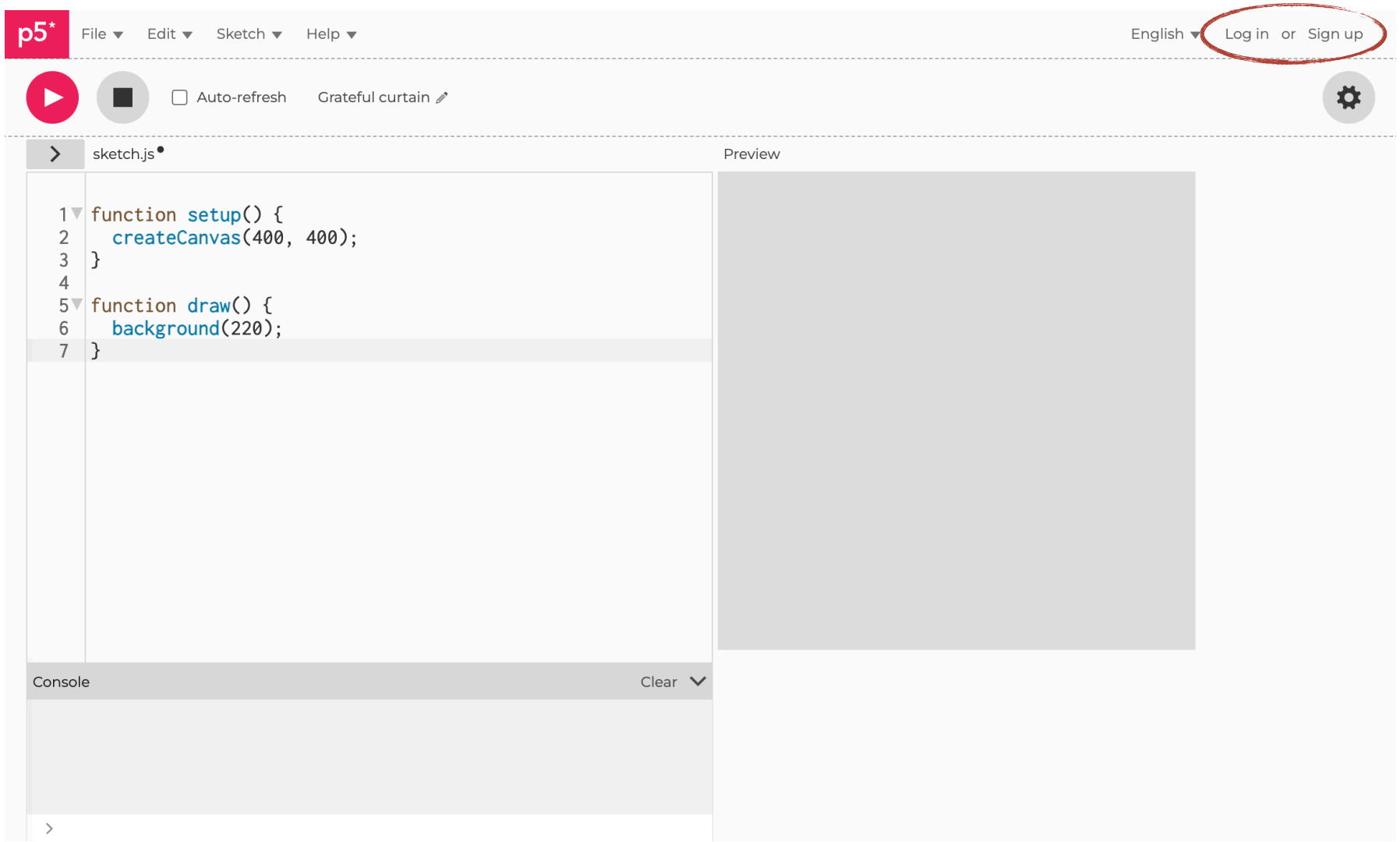


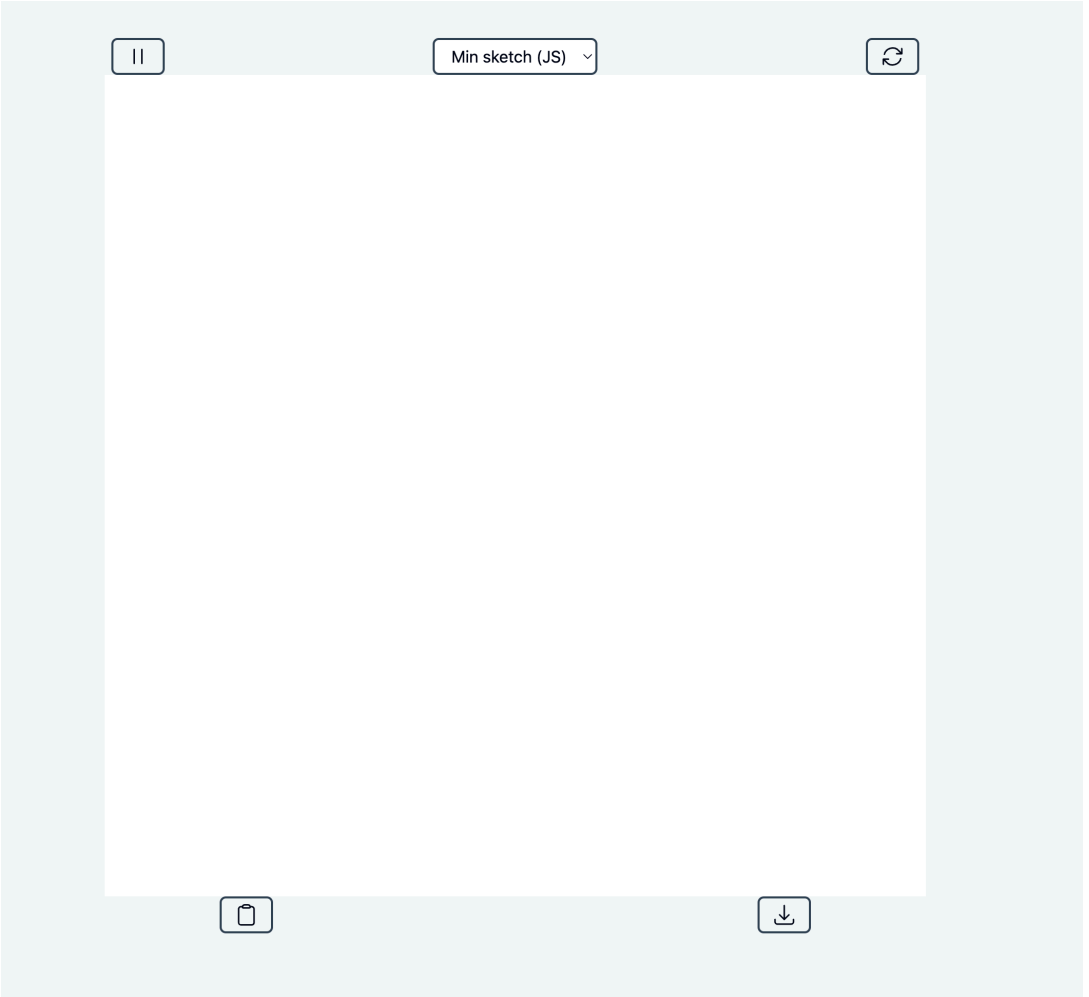

p5.js

p5.js online editor



Sondres Superkule Github Repo™

- Styggere visning (subjektivt)
- Valg mellom TS og JS
- Filsystem
- Bytte mellom flere sketcher
- Knapper for å kopiere eller laste ned bilde



Sondres Superkule Github Repo™

```
1  function setup() {
2    createCanvas(400, 400);
3  }
4
5  function draw() {
6    background(220);
7  }
```

Forskjeller i syntax

```
import P5 from "p5";

export function example(p5: P5) {
  p5.setup = () ⇒ {
    p5.createCanvas(400, 400);
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}
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Kopier det fra eksisterende filer!

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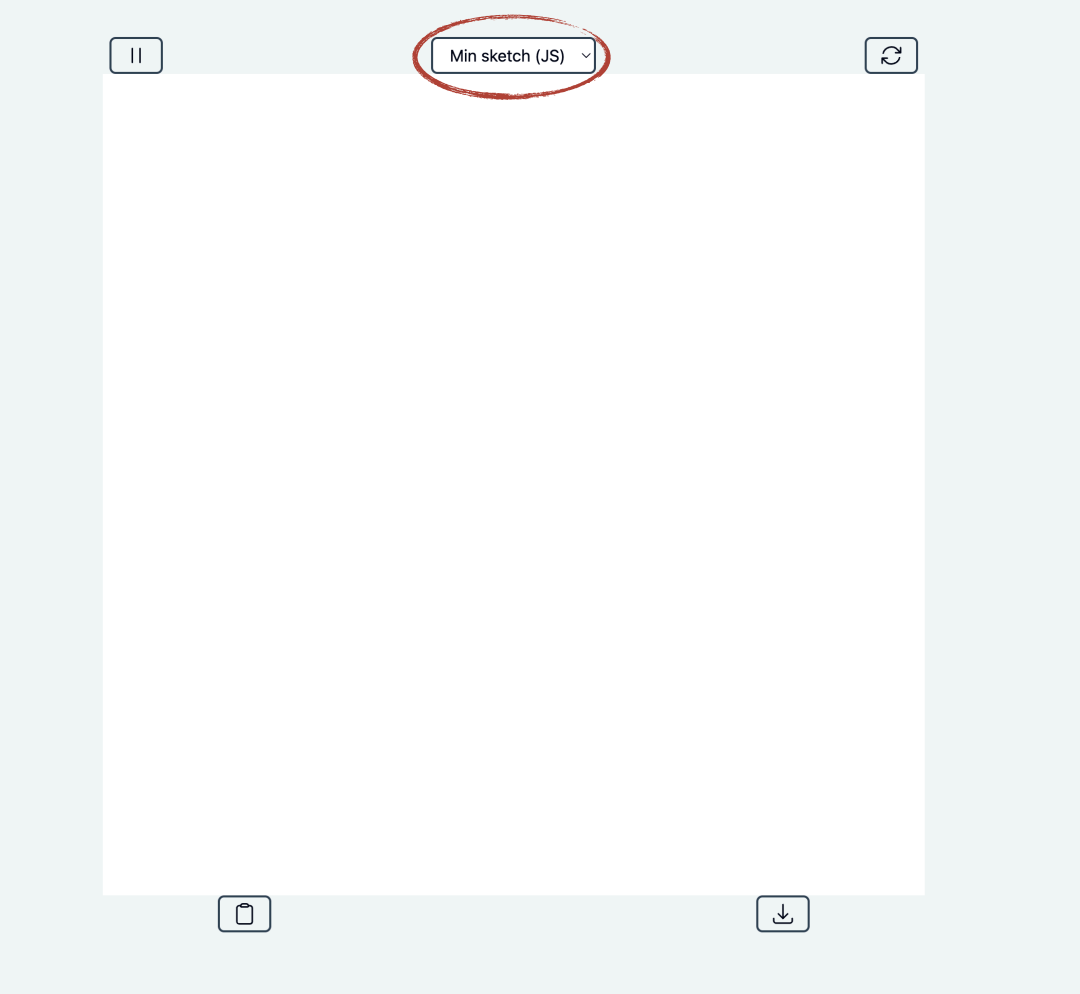

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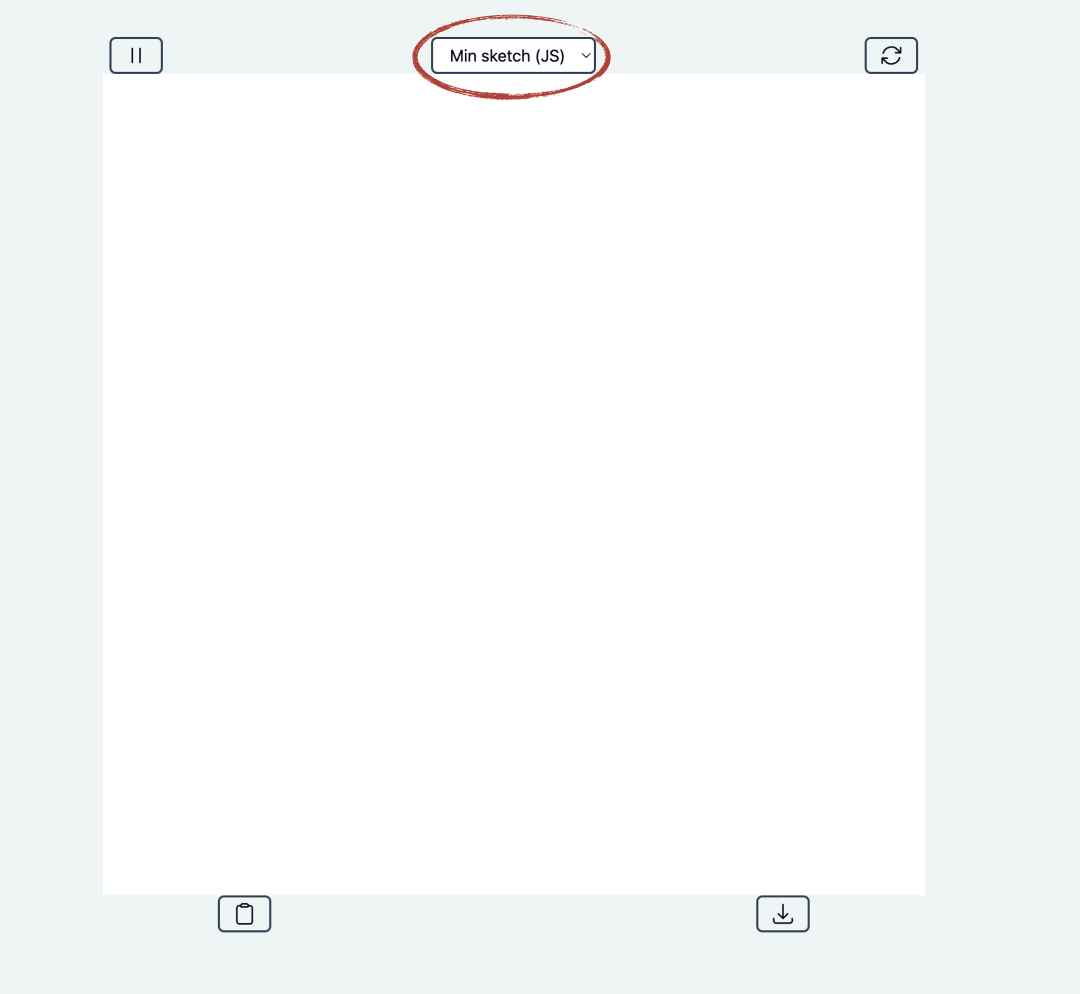

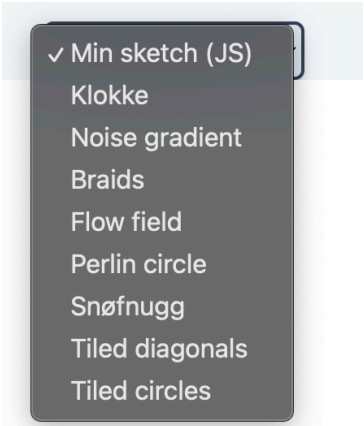

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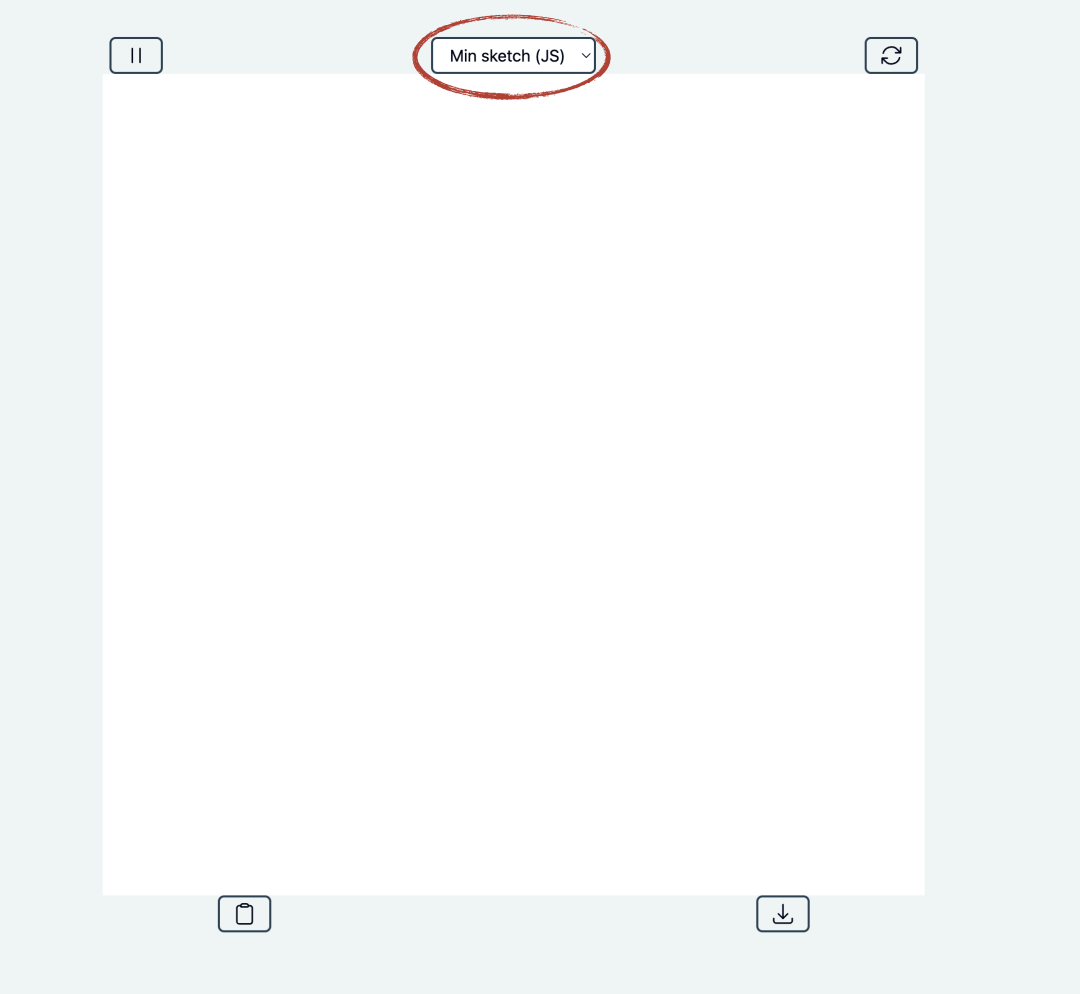

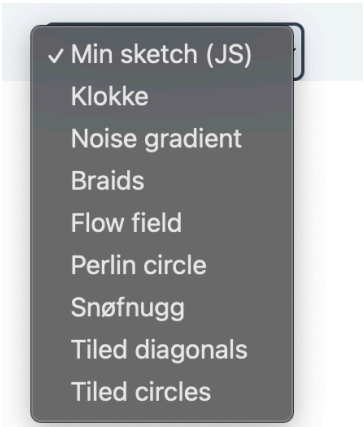


```ts
import { example } from "./example";

export const sketches: Record<string, SketchClosure> = {
  // alle de andre tingene ...
  "Eksempelet fra forrige slide": example,
};
```

Setup og draw

```
import P5 from "p5";

export function example(p5: P5) {
  p5.setup = () => {
    p5.createCanvas(400, 400);
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  p5.draw = () => {
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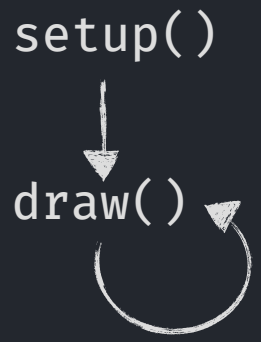

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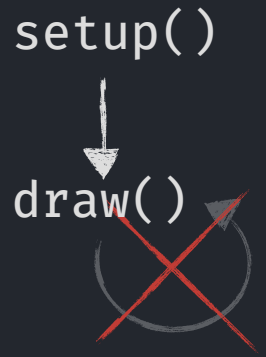

p5.noLoop()

Canvas og koordinatsystem

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Canvas og koordinatsystem

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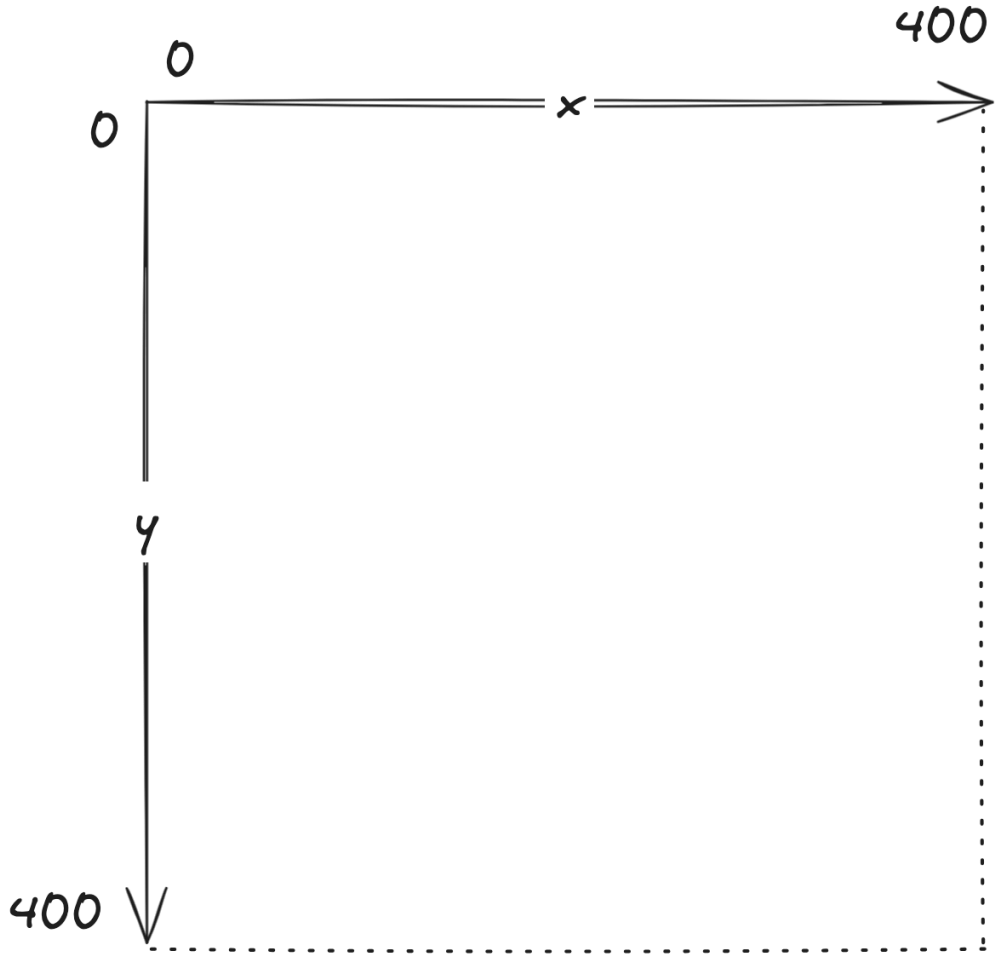
x mot høyre, y nedover



Linje

Linje

```ts
import P5 from "p5";

export function example(p5: P5) {
  const CANVAS = 500;

  p5.setup = () => {
    p5.createCanvas(CANVAS, CANVAS);
  };

  p5.draw = () => {
    p5.noLoop();
    p5.background("white");
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    p5.strokeWeight(2);
    p5.line(0, 0, CANVAS, CANVAS);
  };
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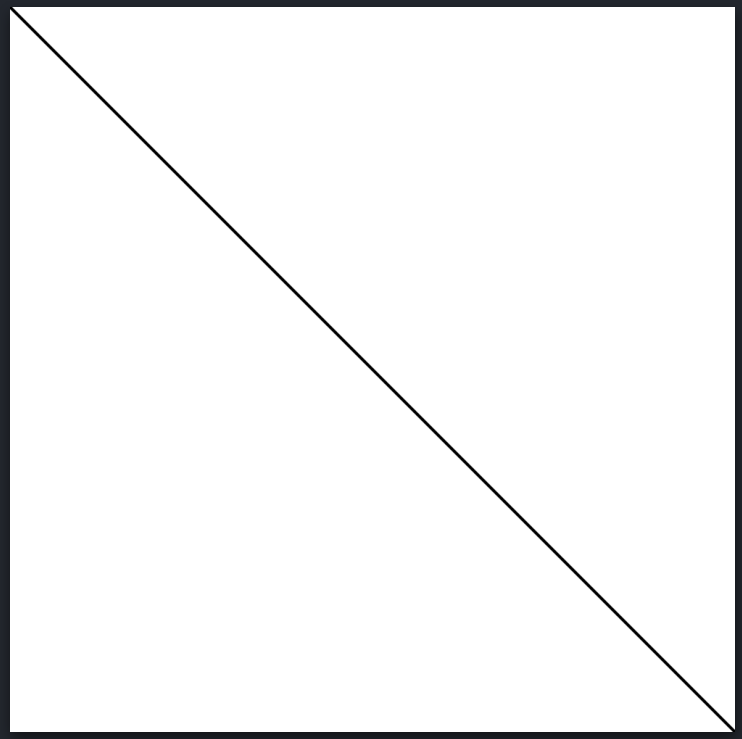

Linje

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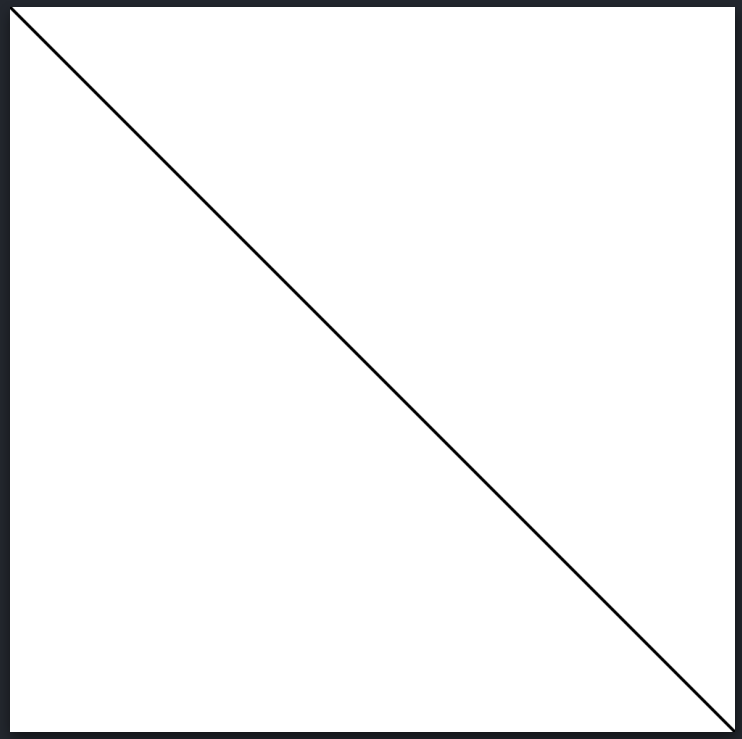
p5.line(0, 0, CANVAS, CANVAS);

p5.line(xFrom, yFrom, xTo, yTo);

const left = 0;
const right = CANVAS;
const top = 0;
const bottom = CANVAS;
p5.line(left, top, right, bottom);
```



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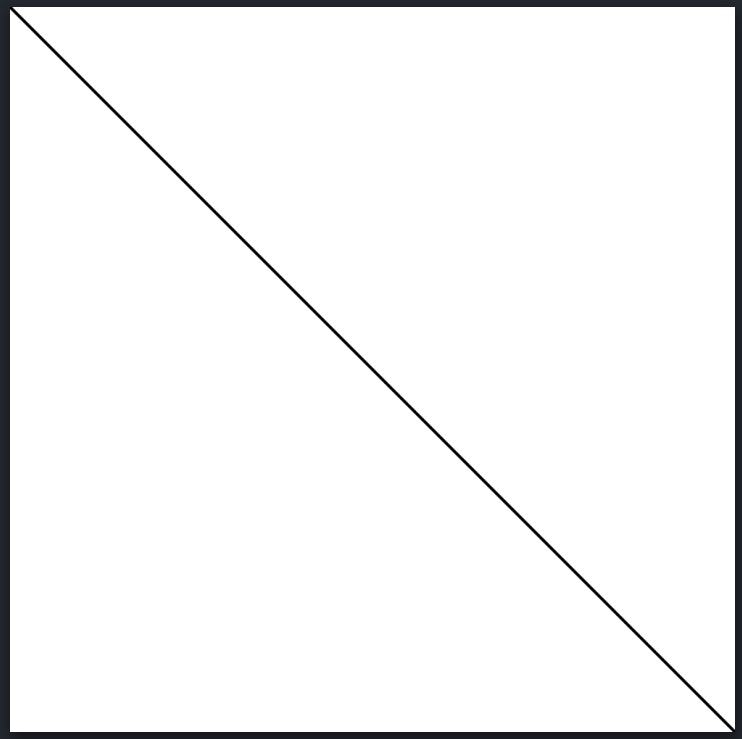

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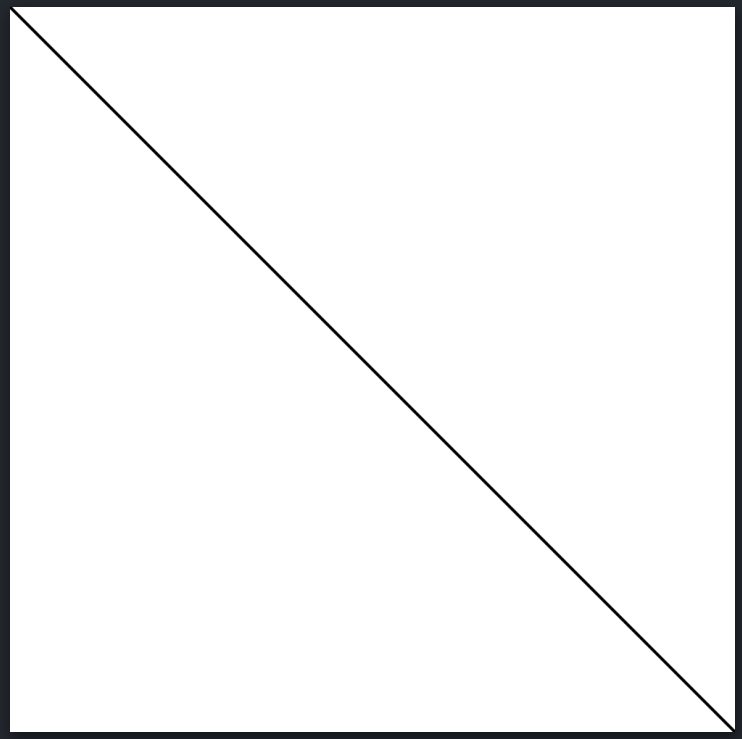

Linje

Var dette generativ kunst?

Ny idé: 50/50 om vi tegner linja den ene veien eller den andre!

Linje

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p5.draw = () => {
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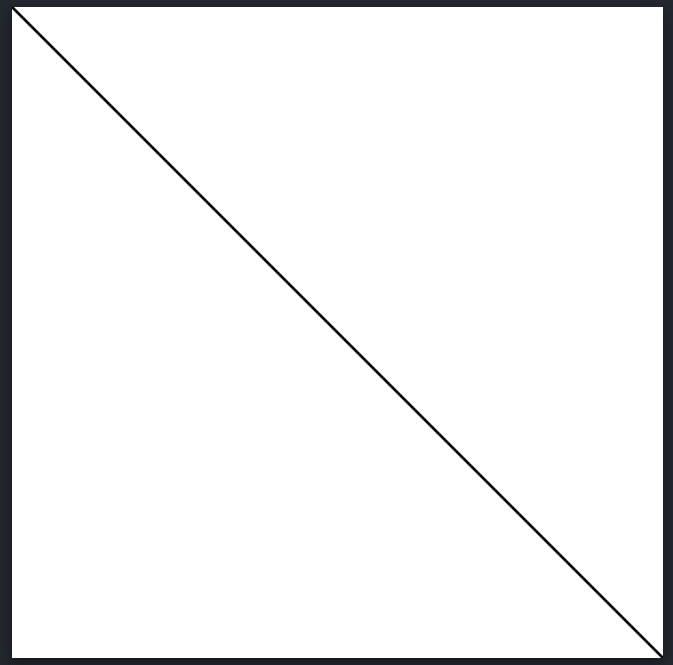
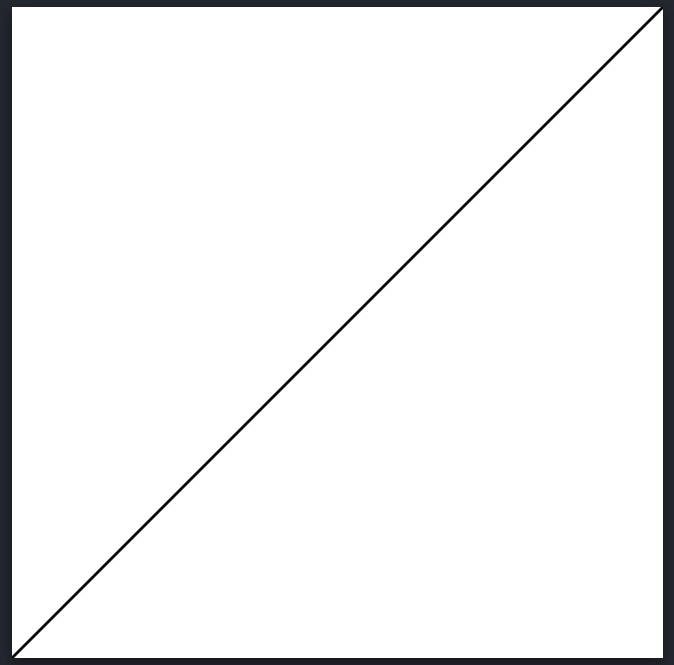
  p5.background("white");
  p5.stroke("black");
  p5.strokeWeight(2);
  const left = 0;
  const right = CANVAS;
  const top = 0;
  const bottom = CANVAS;
  if (p5.random() > 0.5) {
    p5.line(left, top, right, bottom);
  } else {
    p5.line(right, top, left, bottom);
  }
};
```





Repetisjon / tiling

Repetisjon / tiling

Hva hvis vi tegnet det flere ganger?

Strategi: flislegging.

Deler opp canvas i flere små fliser

Gjentar det vi gjorde i forrige eksempel i hver flis

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import P5 from "p5";

export function tilingExample(p5: P5) {
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function drawTile(row: number, column: number) {
  const top = tileSize * row;
  const bottom = top + tileSize;
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  const right = left + tileSize;
  if (p5.random() > 0.5) {
    p5.line(left, top, right, bottom);
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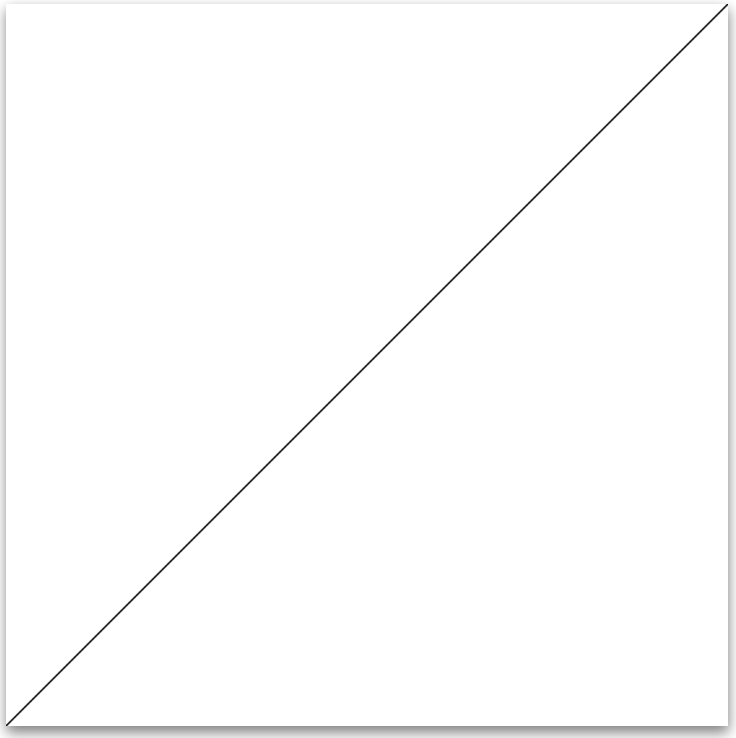
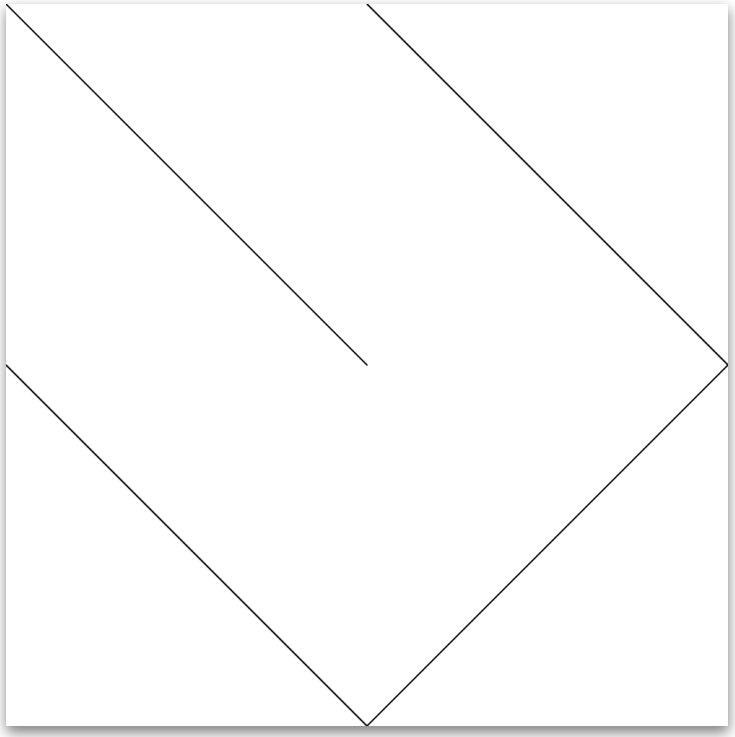
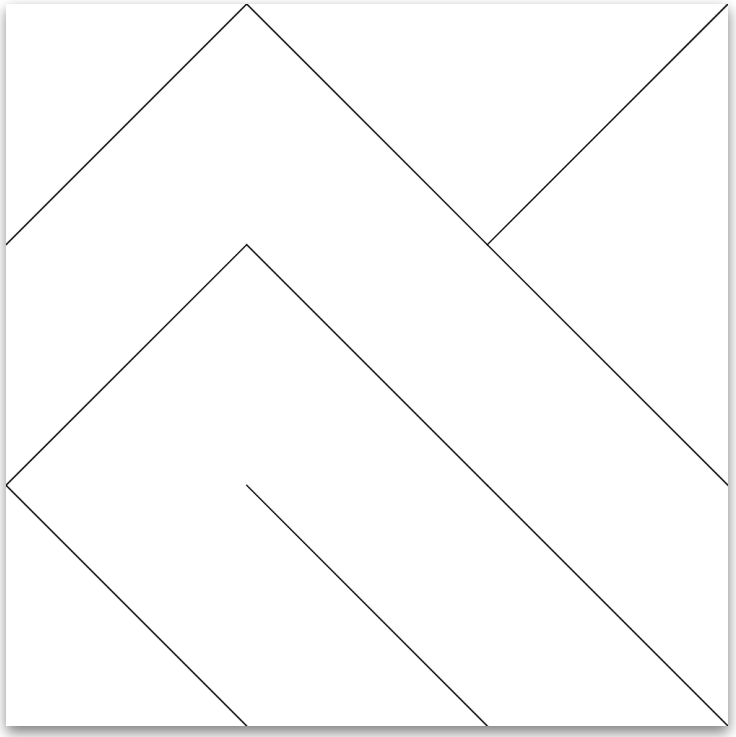


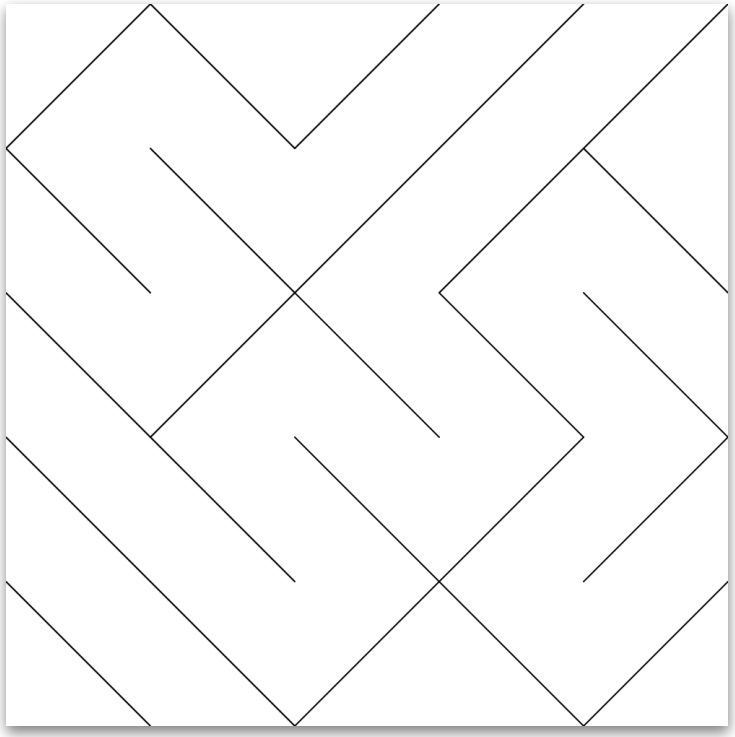
Repetisjon / tiling



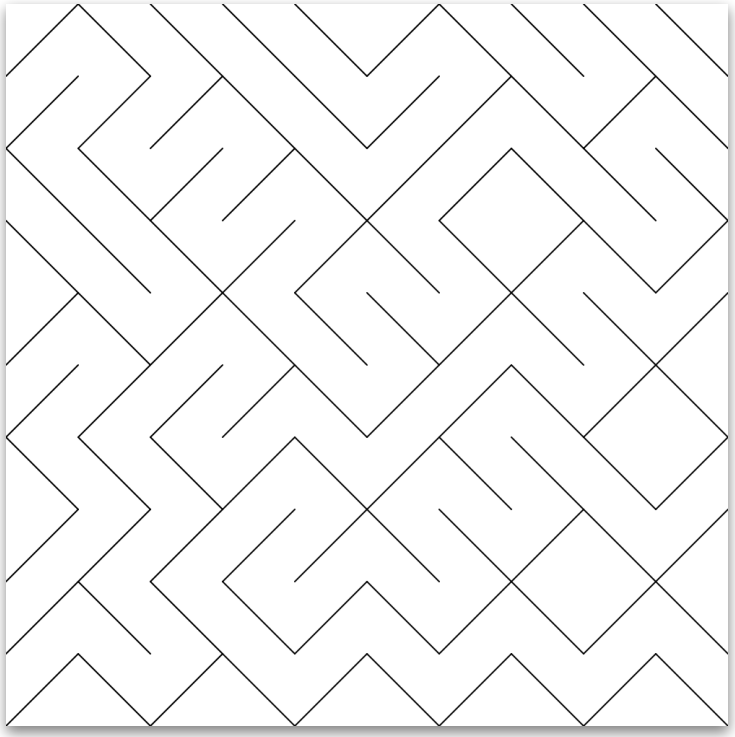
Repetisjon / tiling



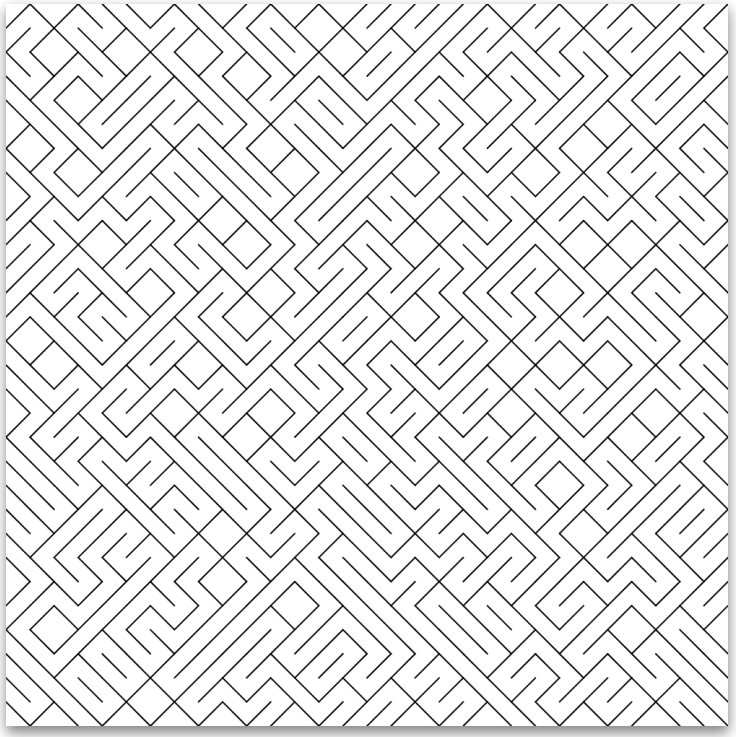
Repetisjon / tiling



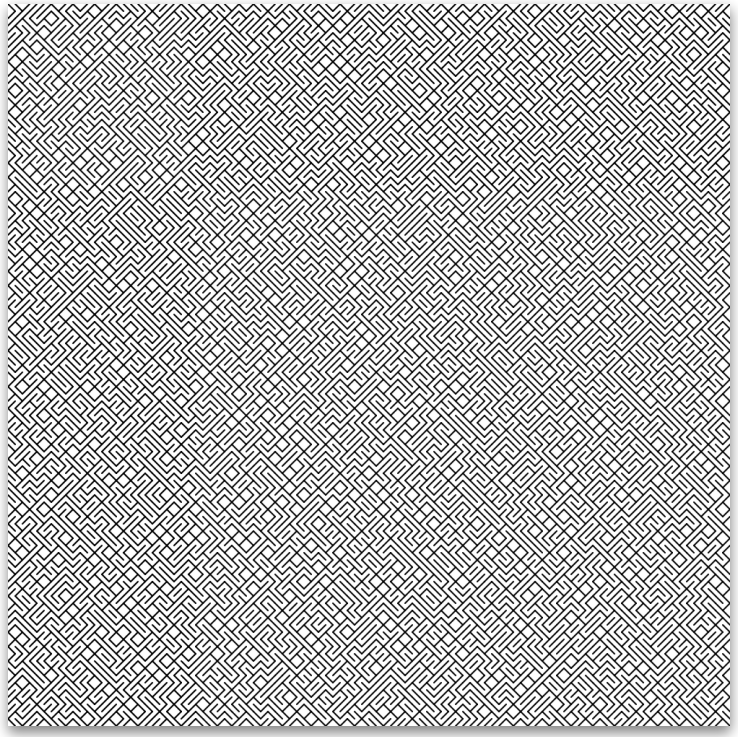
Repetisjon / tiling



Repetisjon / tiling



Repetisjon / tiling



Støy og tilfeldigheter

Støy og tilfeldigheter

Hva var greia med `p5.random()`?

Kan vi bruke den til noe annet?

Idé: tegn en linje, men forskyve den

Støy og tilfeldigheter

```
p5.draw = () ⇒ {
  // forskyver canvas slik at y=0 er midt på
  p5.translate(0, CANVAS / 2);

  const numberOfSections = 100;
  const sectionLength = CANVAS / numberOfSections;
  const amplitude = 100;
  let previousX = 0;
  let previousY = 0;
  for (let i = 0; i < numberOfSections; i++) {
    const newX = previousX + sectionLength;
    const newY = p5.random(-amplitude, amplitude);
    p5.line(previousX, previousY, newX, newY);
    previousX = newX;
    previousY = newY;
  }
};
```

Støy og tilfeldigheter

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    p5.line(previousX, previousY, newX, newY);
    previousX = newX;
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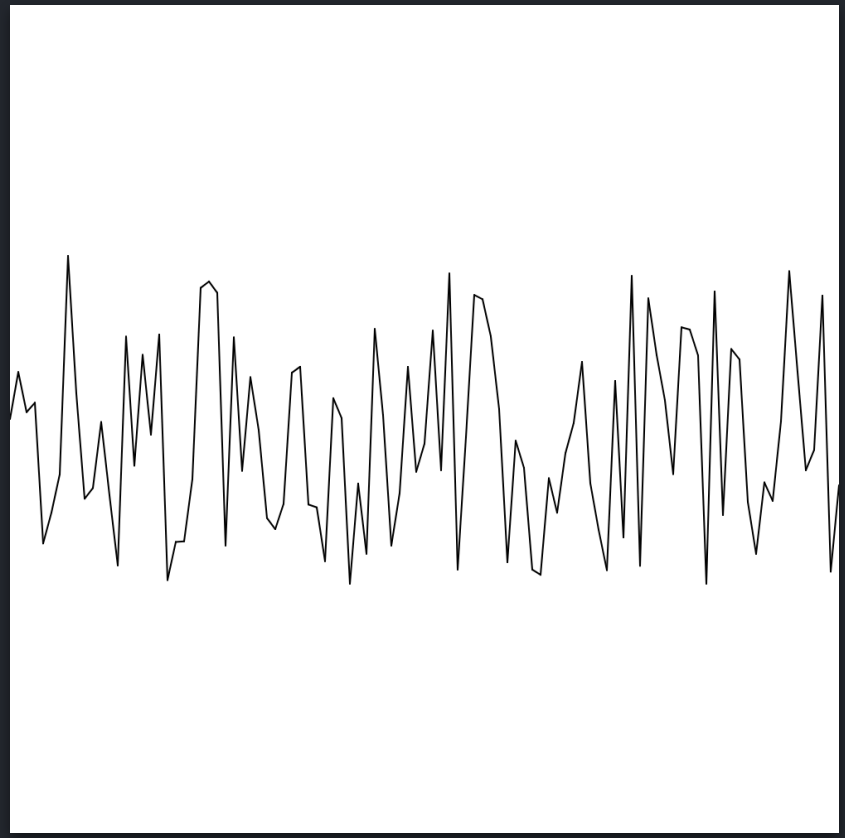
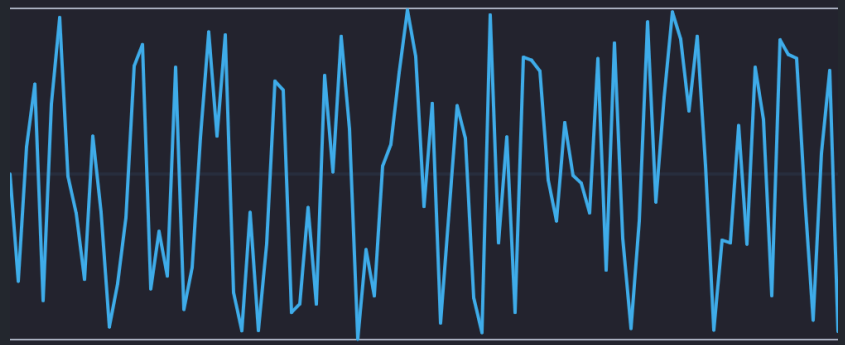
  }
};
```



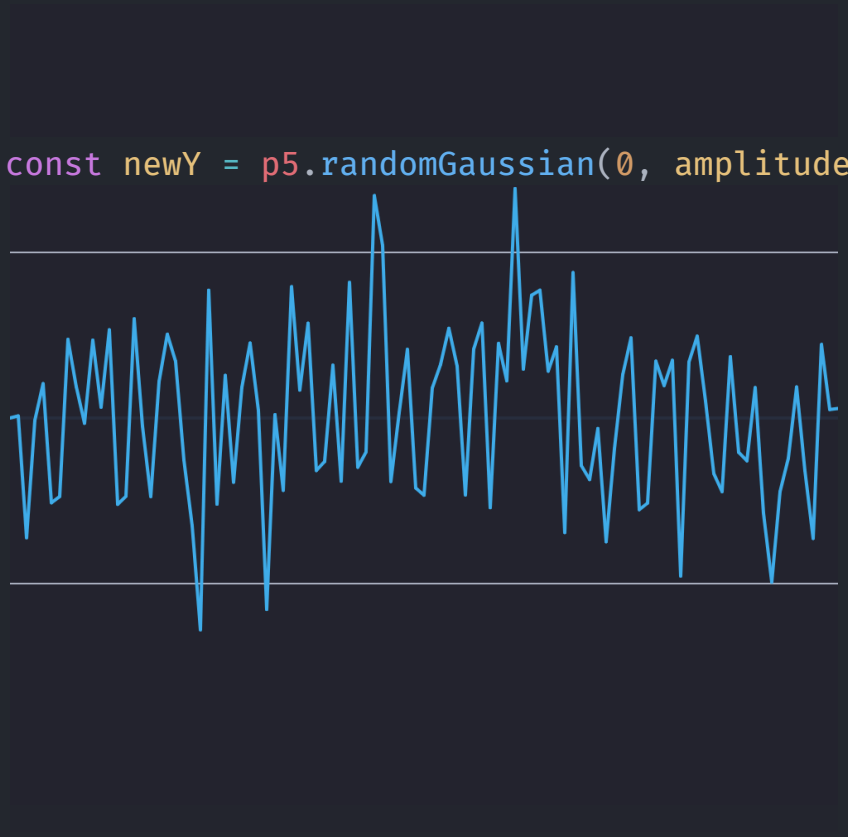
Støy og tilfeldigheter

```
const newY = p5.random(-amplitude, amplitude);
```



Støy og tilfeldigheter

```
const newY = p5.randomGaussian(0, amplitude / 2);
```

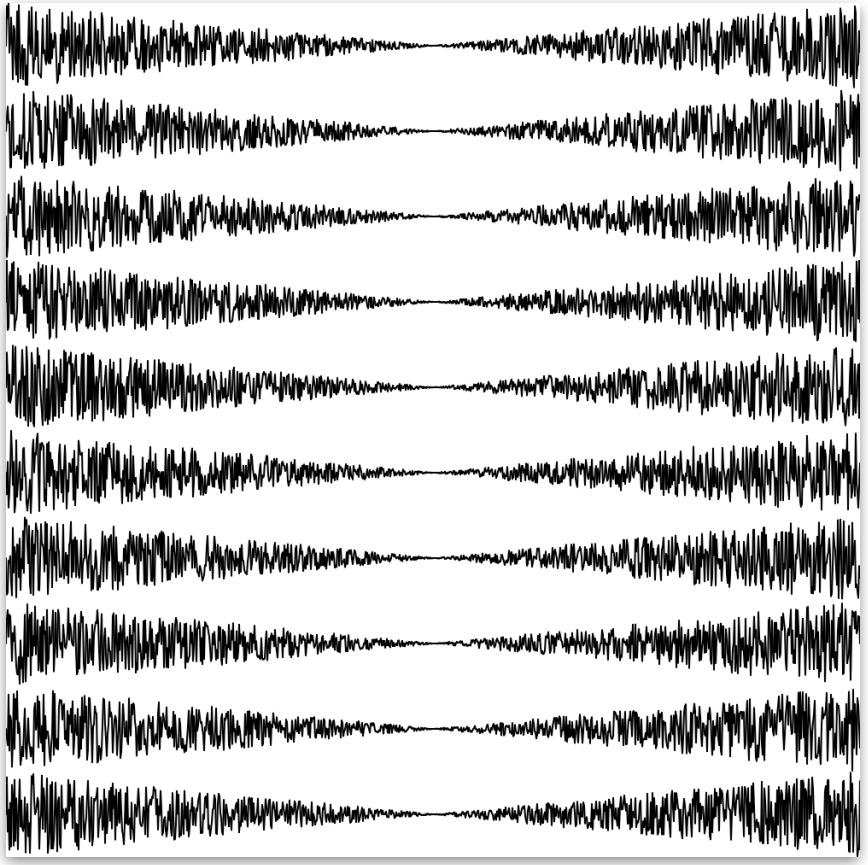


Støy og tilfeldigheter

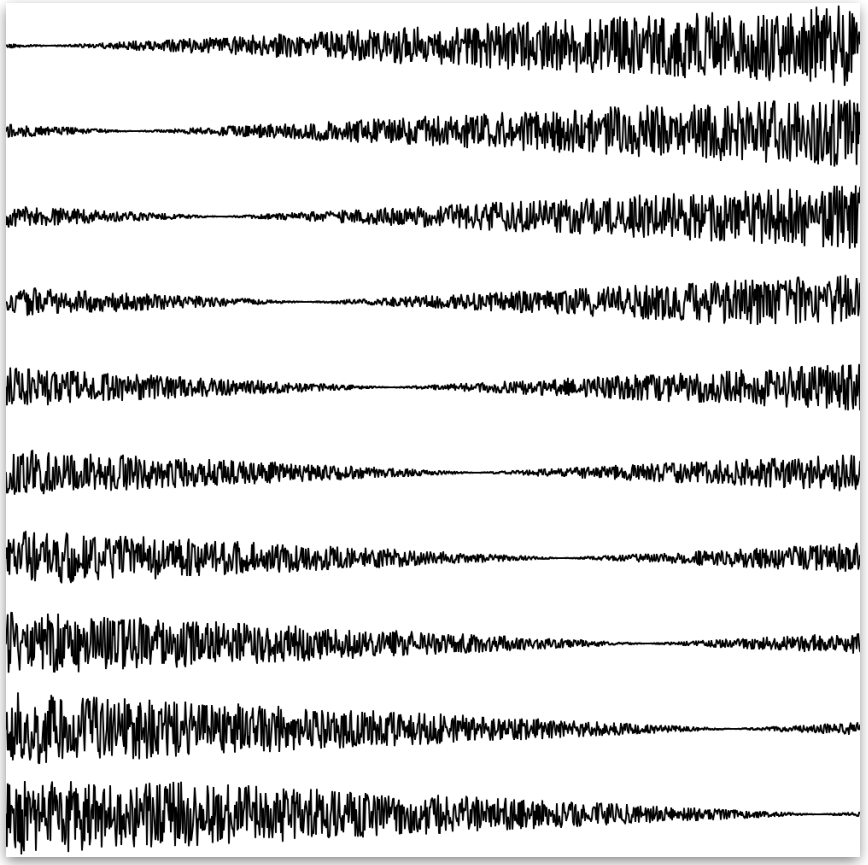
```
const noise = p5.noise(newX * 0.01);
const newY = p5.map(noise, 0, 1, -amplitude, amplitude);
```

Støy og tilfeldigheter

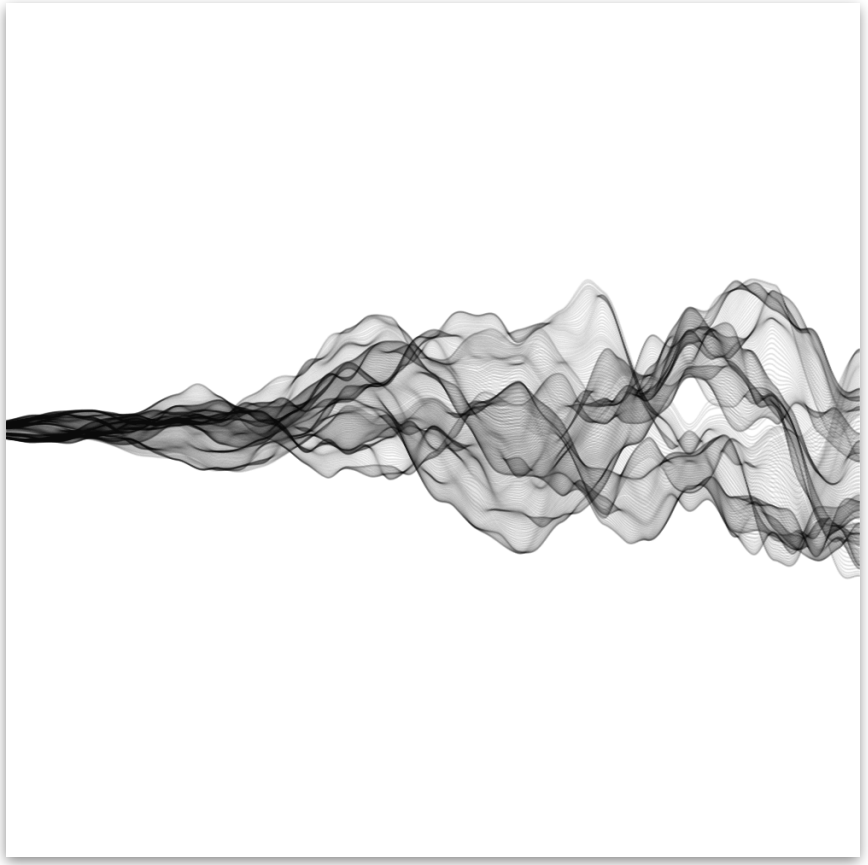
Støy og tilfeldigheter



Støy og tilfeldigheter



Støy og tilfeldigheter

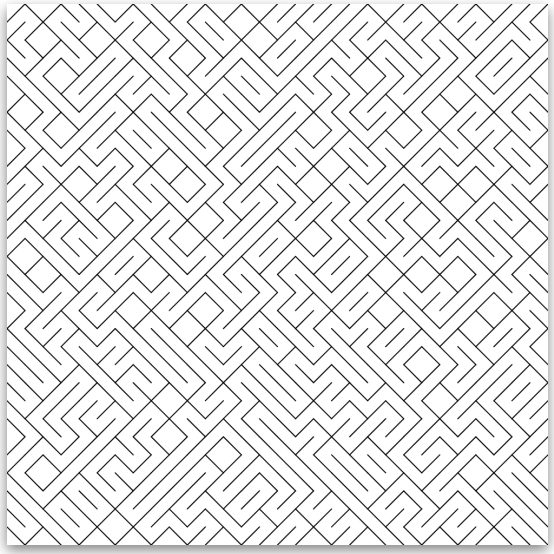


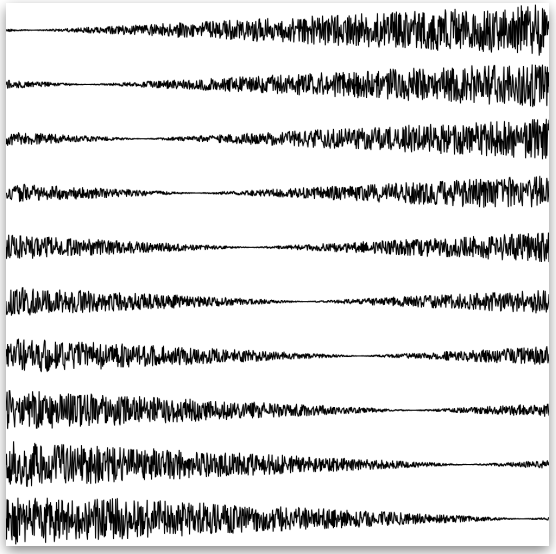
Verktøykassa og galleriet

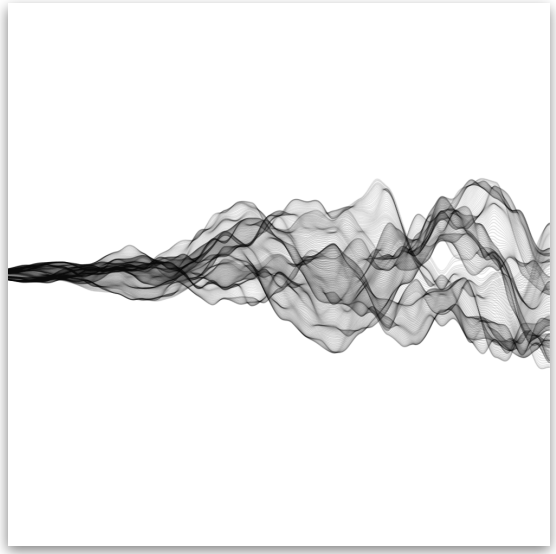
Linjer

Flislegging

Støy







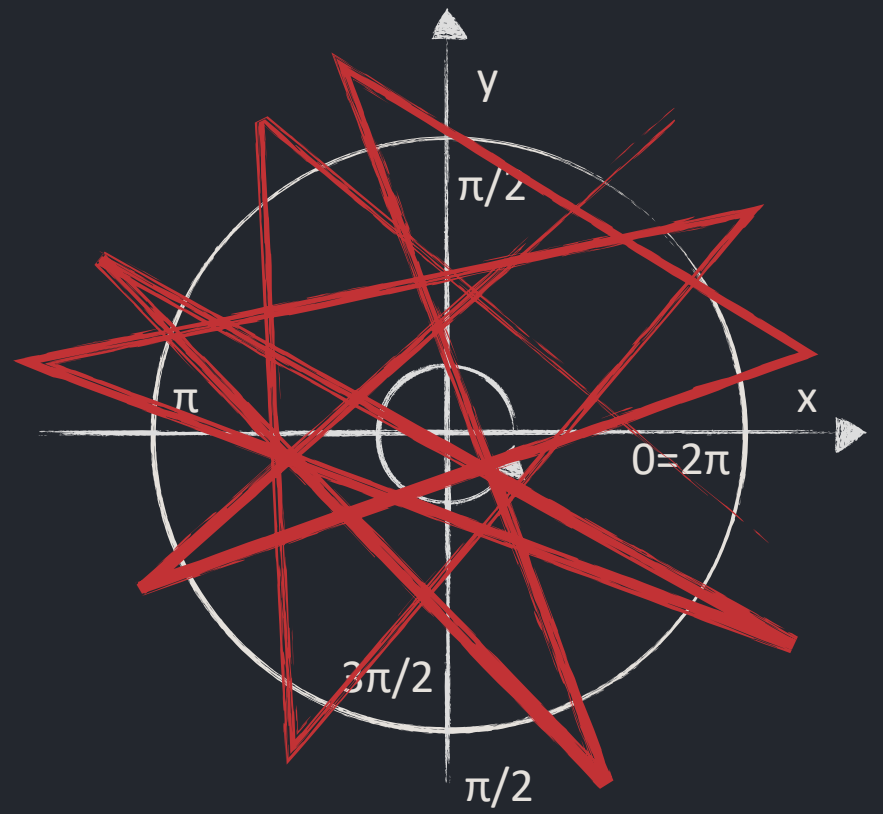
Buer

Buer

```
p5.arc(
  ellipseCenterX, // x-koordinat til senteret av ellipsen
  ellipseCenterY, // y-koordinat til senteret av ellipsen
  ellipseWidth, // bredden til ellipsen, hvis du hadde tegnet hele
  ellipseHeight, // høyden til ellipsen, hvis du hadde tegnet hele
  startAngle, // startvinkelen til buen, i radianer
  endAngle // sluttvinkelen til buen, i radianer
);
```

Buer

```
p5.arc(
  ellipseCenterX, // x-koordinat til senteret av ellipsen
  ellipseCenterY, // y-koordinat til senteret av ellipsen
  ellipseWidth, // bredden til ellipsen, hvis du hadde tegnet hele
  ellipseHeight, // høyden til ellipsen, hvis du hadde tegnet hele
  startAngle, // startvinkelen til buen, i radianer
  endAngle // sluttvinkelen til buen, i radianer
);
```



Buer

```
p5.arc(
  ellipseCenterX, // x-koordinat til senteret av ellipsen
  ellipseCenterY, // y-koordinat til senteret av ellipsen
  ellipseWidth, // bredden til ellipsen, hvis du hadde tegnet hele
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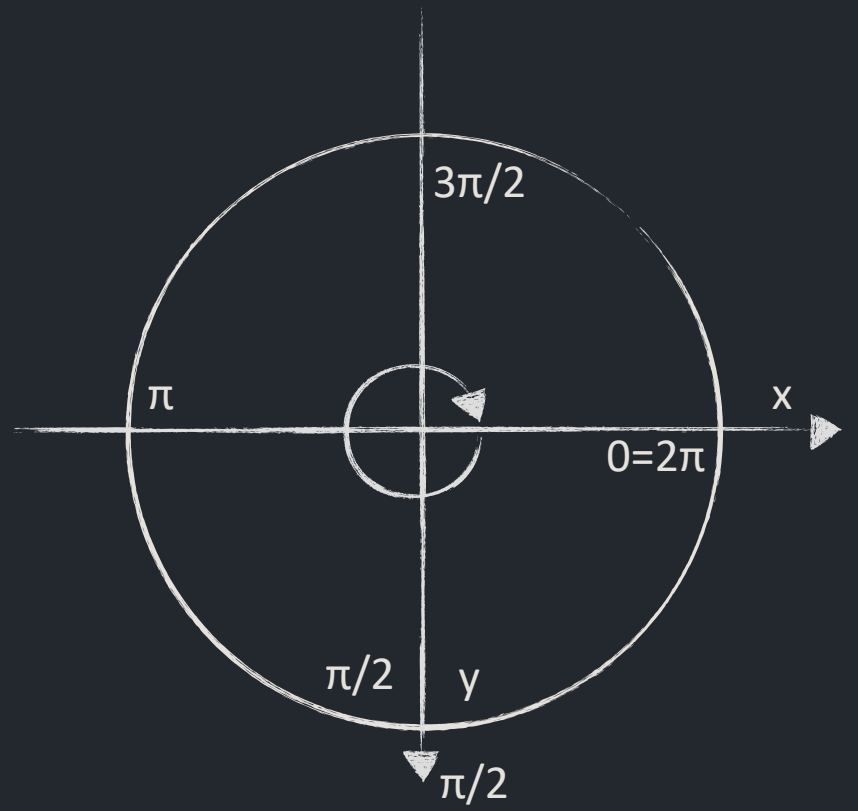
  startAngle, // startvinkelen til buen, i radianer
  endAngle // sluttvinkelen til buen, i radianer
);
```



Buer

```
function drawQuarterCircle(
  circleCenterX: number,
  circleCenterY: number,
  circleRadius: number,
  startAngle: number
) {
  p5.arc(
    circleCenterX,
    circleCenterY,
    circleRadius * 2,
    circleRadius * 2,
    startAngle,
    startAngle + p5.HALF_PI
  );
}
```

```
const left = 0;
const right = CANVAS;
const top = 0;
const bottom = CANVAS;
if (p5.random() > 0.5) {
  drawQuarterCircle(left, bottom, CANVAS / 2, p5.PI + p5.HALF_PI);
  drawQuarterCircle(right, top, CANVAS / 2, p5.HALF_PI);
} else {
  drawQuarterCircle(left, top, CANVAS / 2, 0);
  drawQuarterCircle(right, bottom, CANVAS / 2, p5.PI);
}
```

Buer

```
function drawQuarterCircle(
  circleCenterX: number,
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) {
  p5.arc(
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    startAngle,
    startAngle + p5.HALF_PI
  );
}
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} else {
  drawQuarterCircle(left, top, CANVAS / 2, 0);
  drawQuarterCircle(right, bottom, CANVAS / 2, p5.PI);
}
```

Buer

```
function drawQuarterCircle(
  circleCenterX: number,
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) {
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} else {
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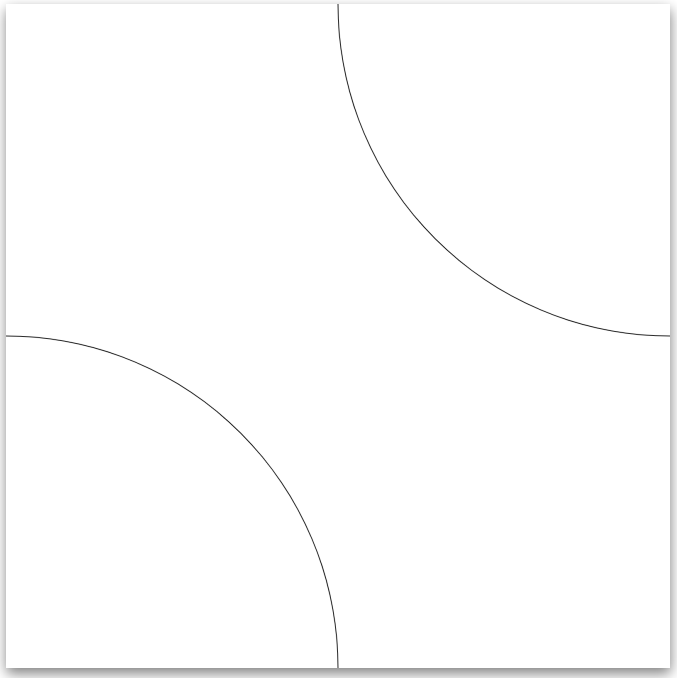
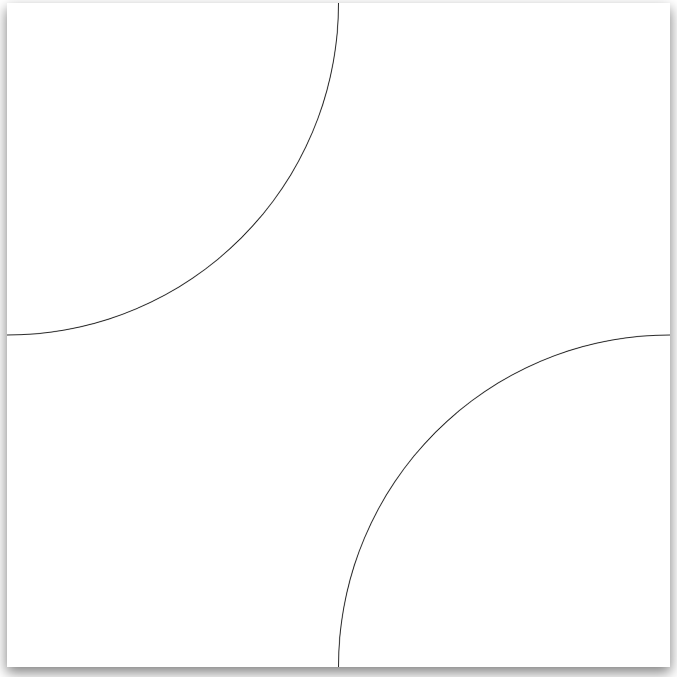
  drawQuarterCircle(right, bottom, CANVAS / 2, p5.PI);
}
```

Buer





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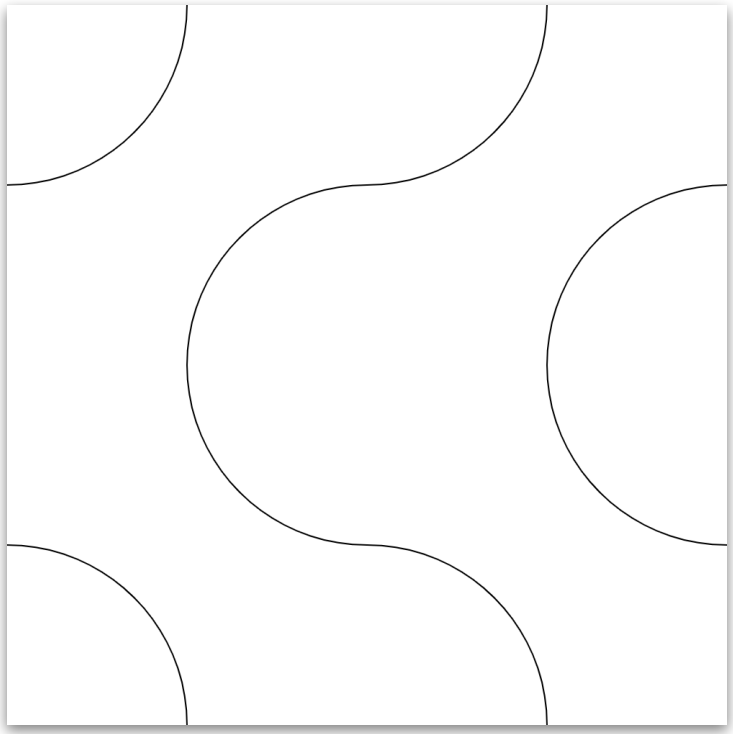

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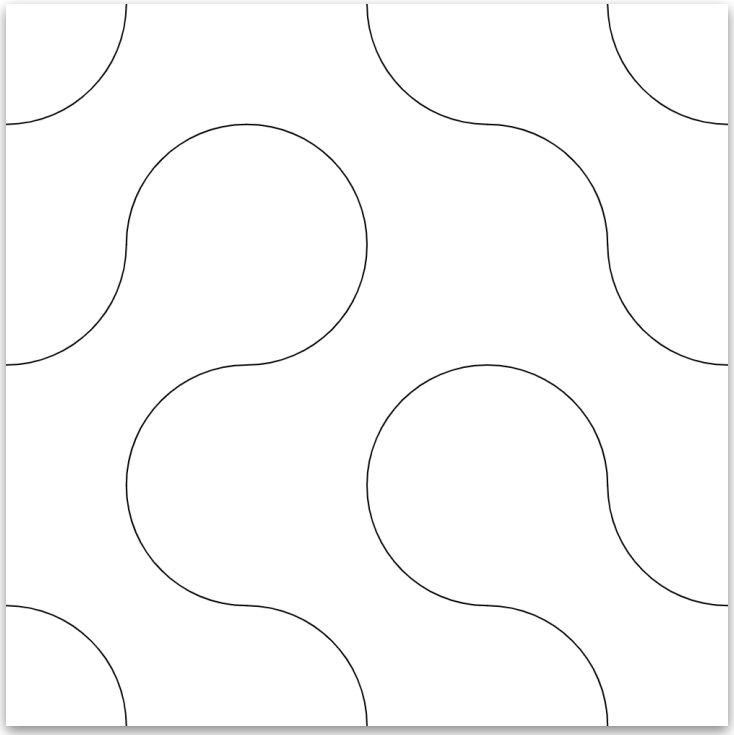
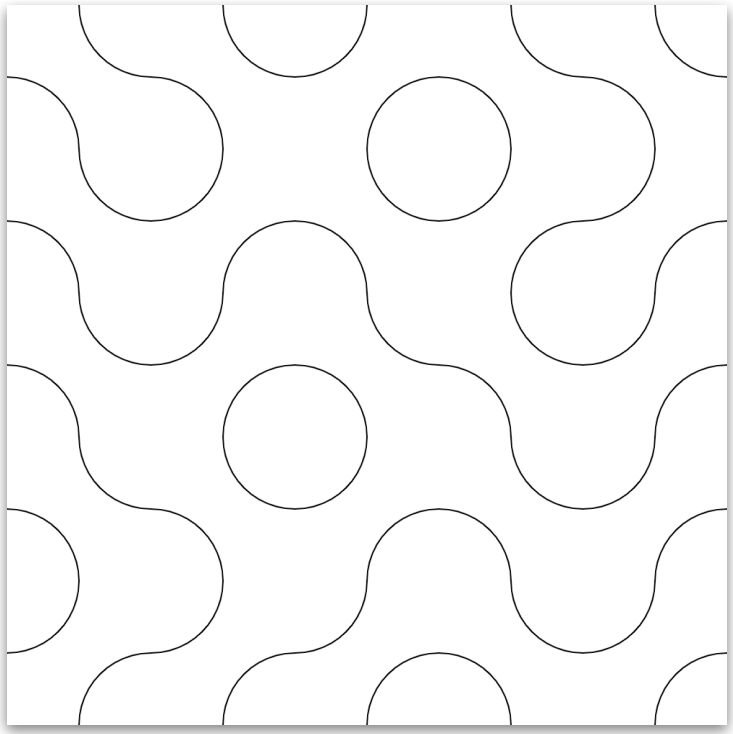
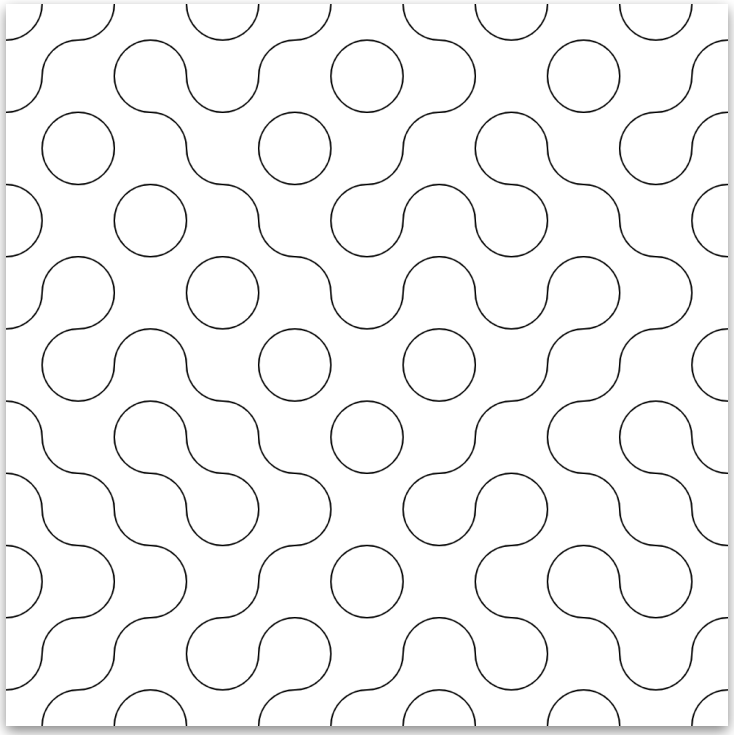


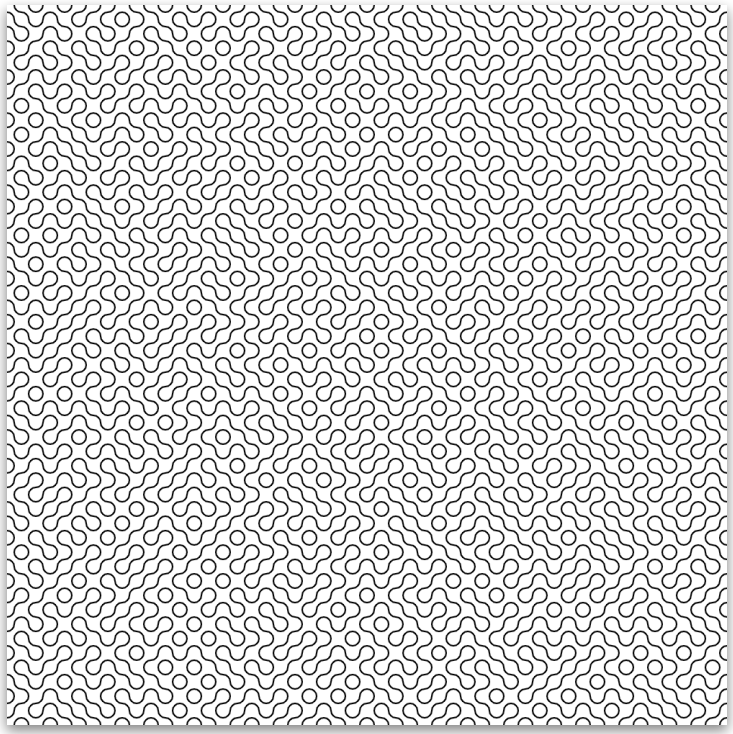
Buer



Buer



Buer



Former

Masse å velge mellom!

Former

```
p5.quad // firkantede polygoner
p5.rect // rektangel
p5.square // kvadrat

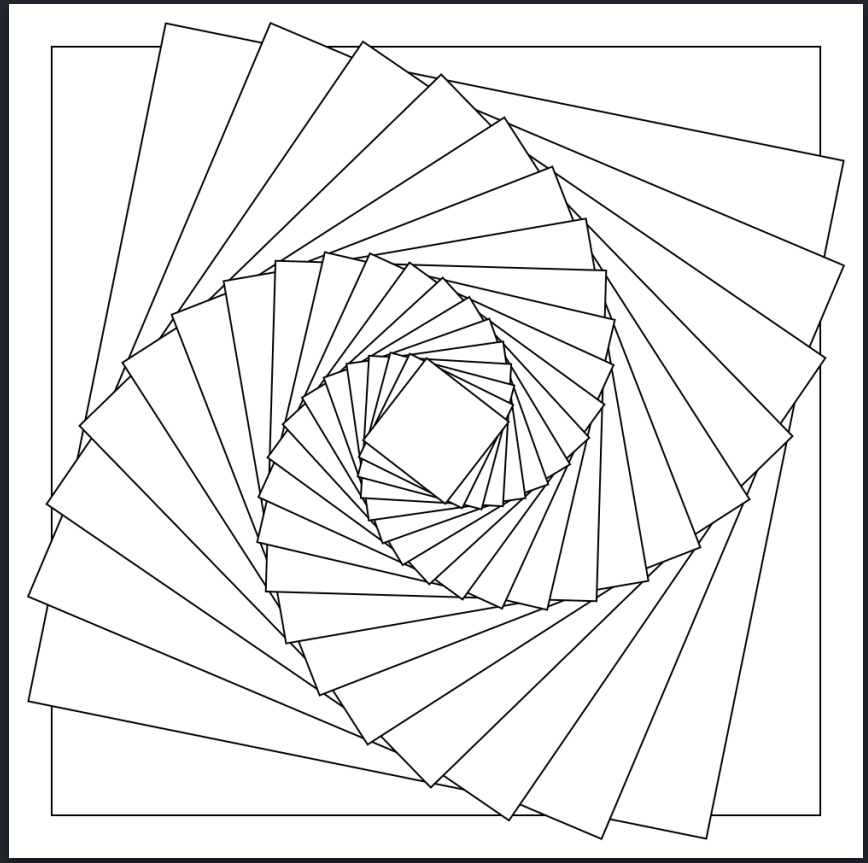
p5.ellipse // ellipse
p5.circle // sirkel
p5.arc // del av ellipse

p5.triangle // trekant

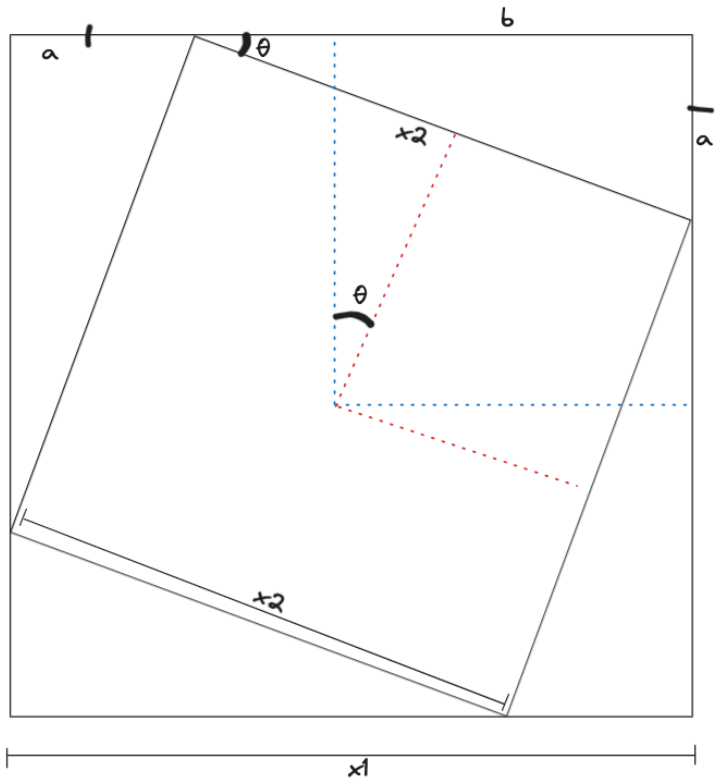
p5.beginShape // starter en figur
p5.vertex // legger til et punkt i en figur
p5.endShape // avslutter en figur
```

Former

```
p5.draw = () => {
  p5.noLoop();
  let size = CANVAS * 0.9;
  p5.translate(CANVAS / 2, CANVAS / 2);
  p5.rectMode(p5.CENTER);
  for (let i = 0; i < repeats; i++) {
    p5.square(0, 0, size);
    p5.rotate(angle);
    size = size * sizeScaling;
  }
};
```



Former



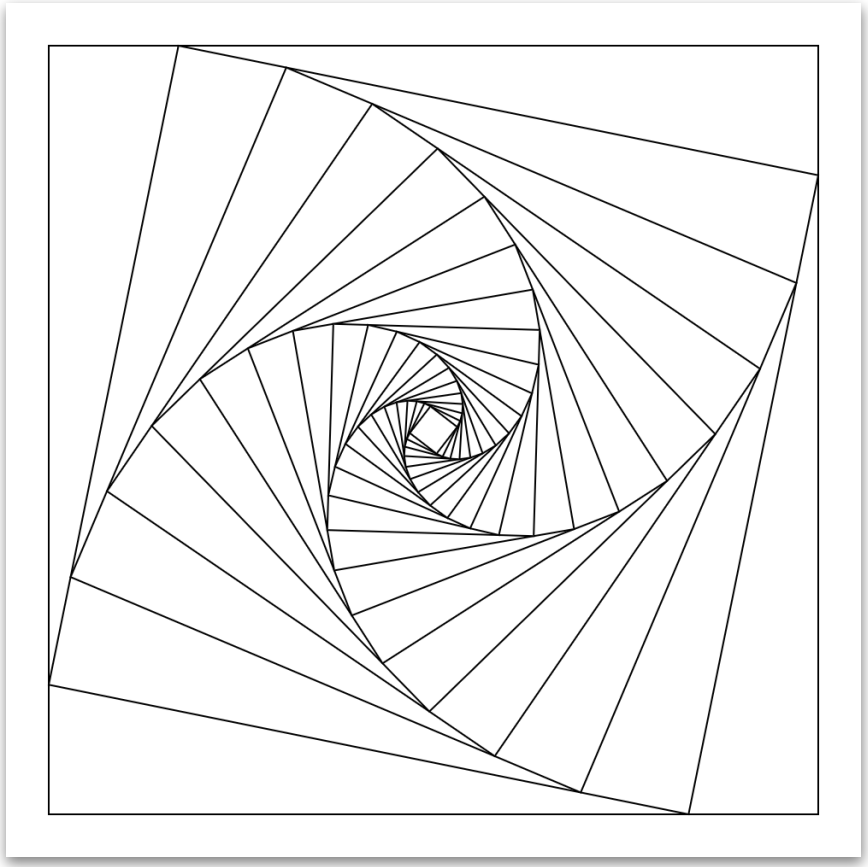
$a+b=x1$

$\sin(\theta) = a / x2 \rightarrow a = x2 * \sin(\theta)$

$\cos(\theta) = b / x2 \rightarrow b = x2 * \cos(\theta)$

$x2*\sin(\theta) + x2*\cos(\theta) = x1$

$x2 = x1/(\sin(\theta) + \cos(\theta))$



Verktøykassa og galleriet

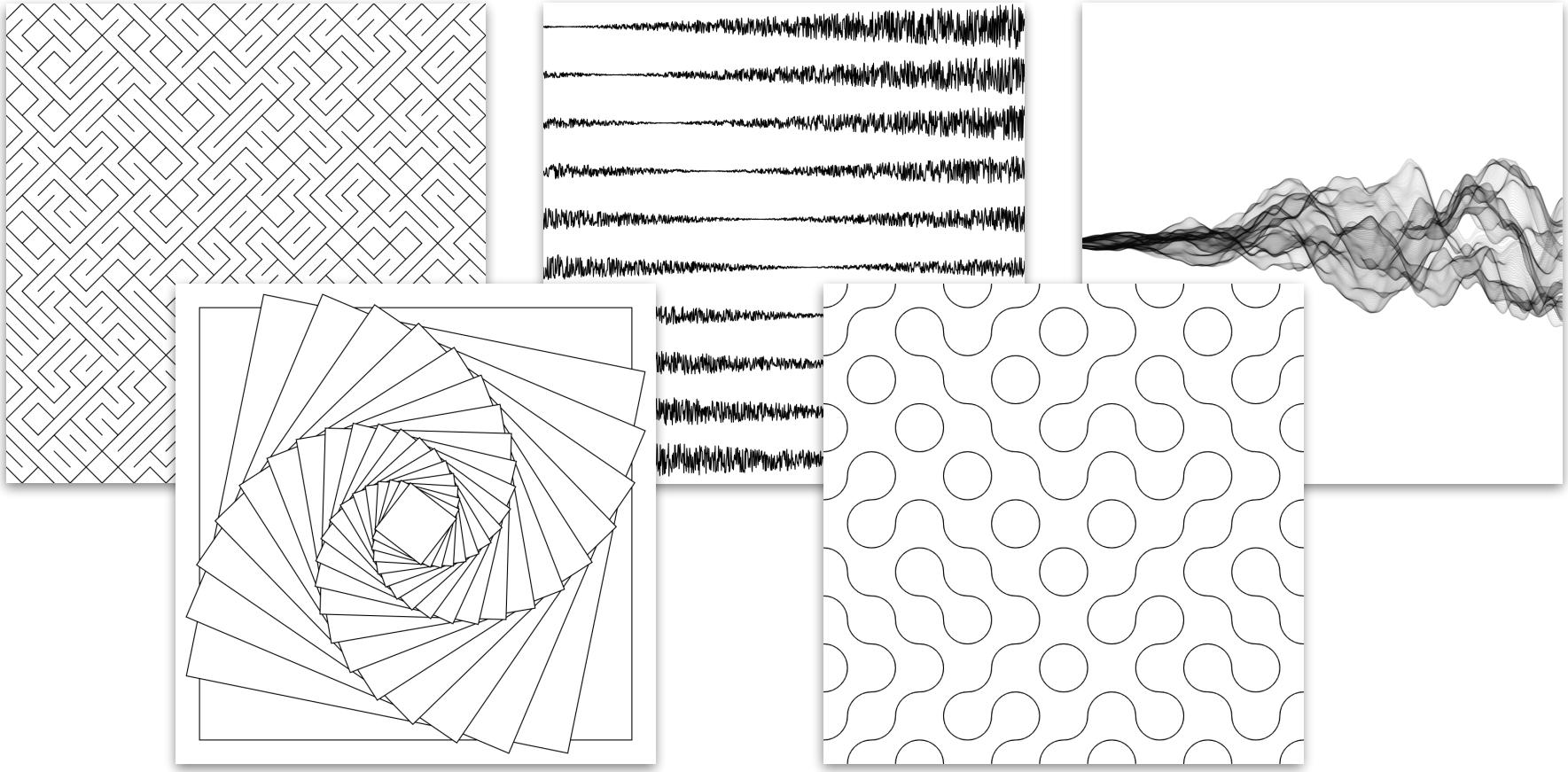
Linjer

Flislegging

Støy

Buer

Former



Farger

```
p5.background("black");
p5.fill("black");
p5.stroke("black");

const color = p5.color("black");
p5.background(color);
p5.fill(color);
p5.stroke(color);
```

```
p5.color("black"); // CSS-farger
p5.color("#000000"); // Hex-kode
p5.color(0); // Gråtone, 0-255
p5.color(0, 0, 0); // RGB, 0-255
p5.color(0, 0, 0, 255); // RGBA, 0-255

p5.colorMode(p5.HSL);
p5.lerpColor(color1, color2, 0.5); // 50% mellom color1 og color2
```

Farger

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p5.background("black");
p5.fill("black");
p5.stroke("black");

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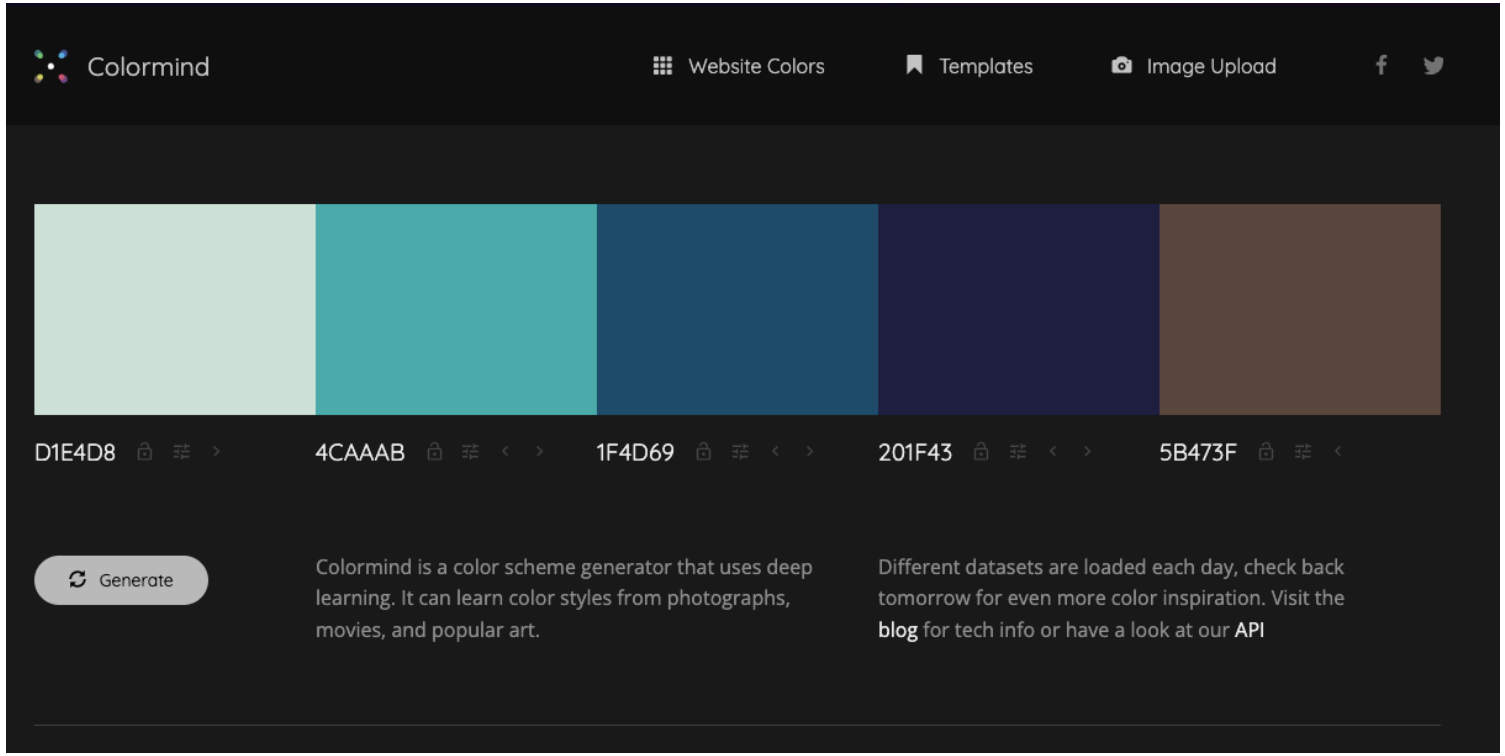
p5.color(0, 0, 0, 255); // RGBA, 0-255

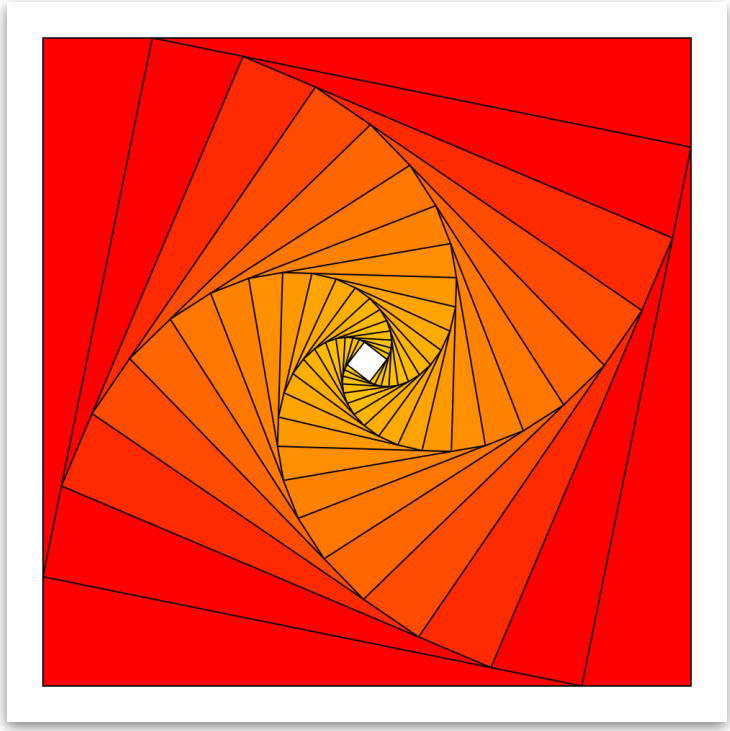
p5.colorMode(p5.HSL);
p5.lerpColor(color1, color2, 0.5); // 50% mellom color1 og color2
```

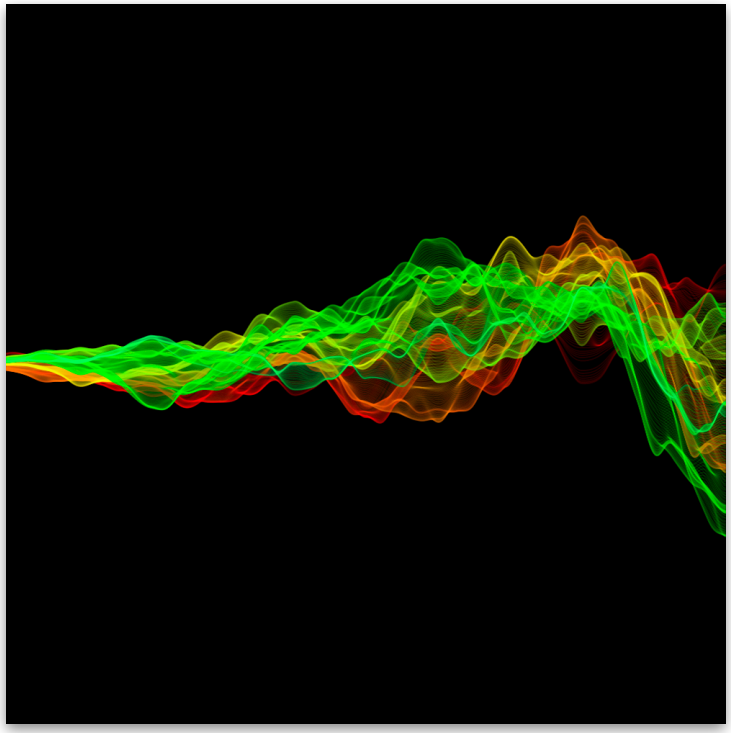
Farger

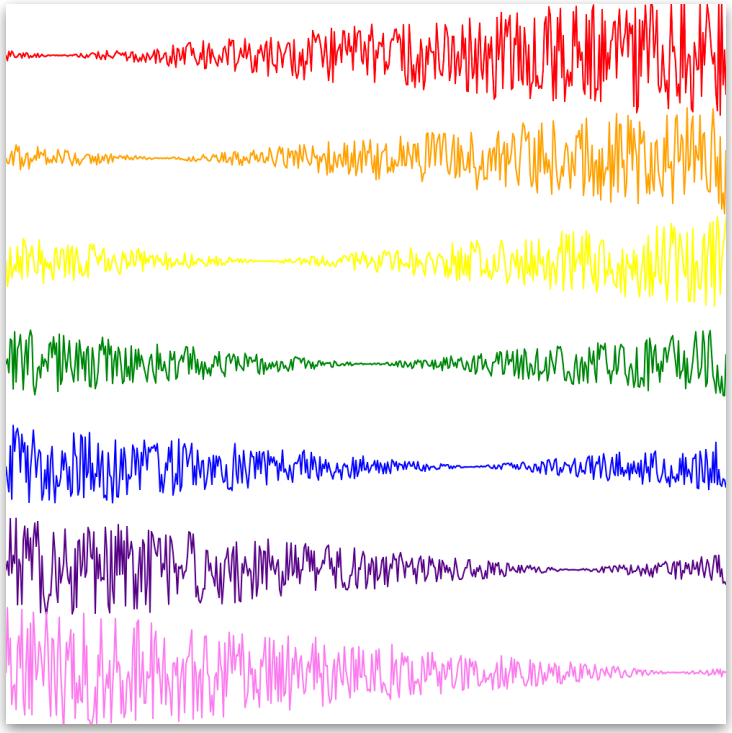
Vanskelig å generere bra paletter selv, gå for “håndplukket"



Farger







Tid og bevegelse

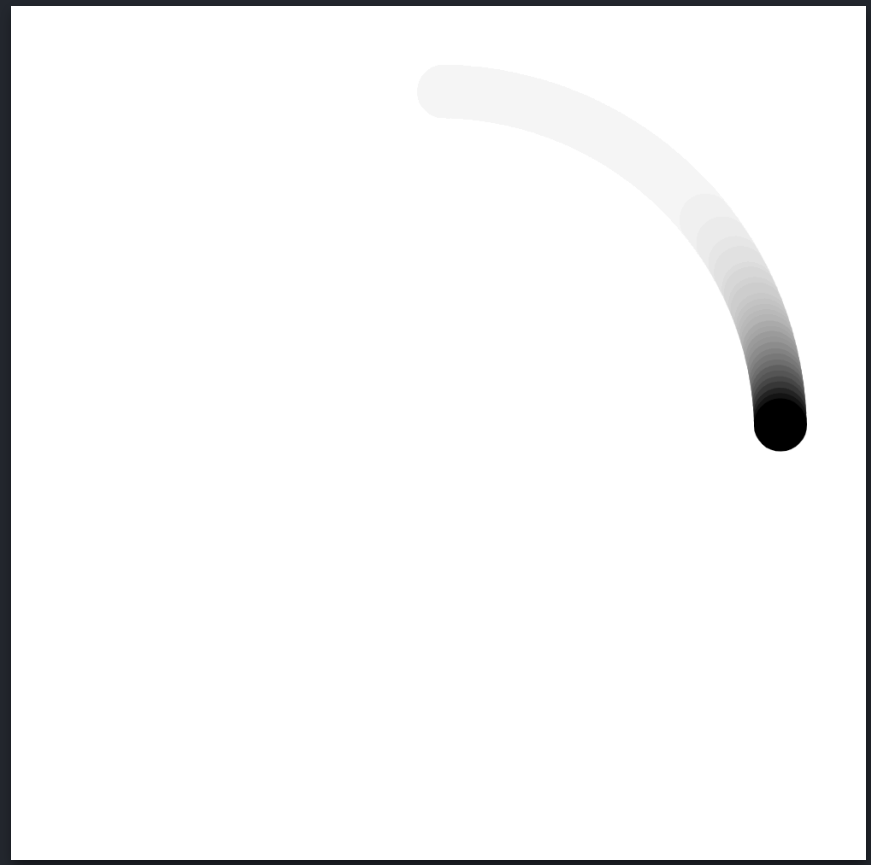
```
export function timeExample(p5: P5) {
  const CANVAS = 500;
  let timeInSeconds = 0;

  p5.setup = () => {
    p5.createCanvas(CANVAS, CANVAS);
    p5.background("white");
  };

  p5.draw = () => {
    timeInSeconds += p5.deltaTime / 1_000;
    p5.background(255, 20);

    p5.translate(CANVAS / 2, CANVAS / 2);
    p5.rotate(timeInSeconds);

    p5.fill("black");
    p5.circle(0, 200, 30);
  };
}
```



Verktøykassa og galleriet

Linjer

Flislegging

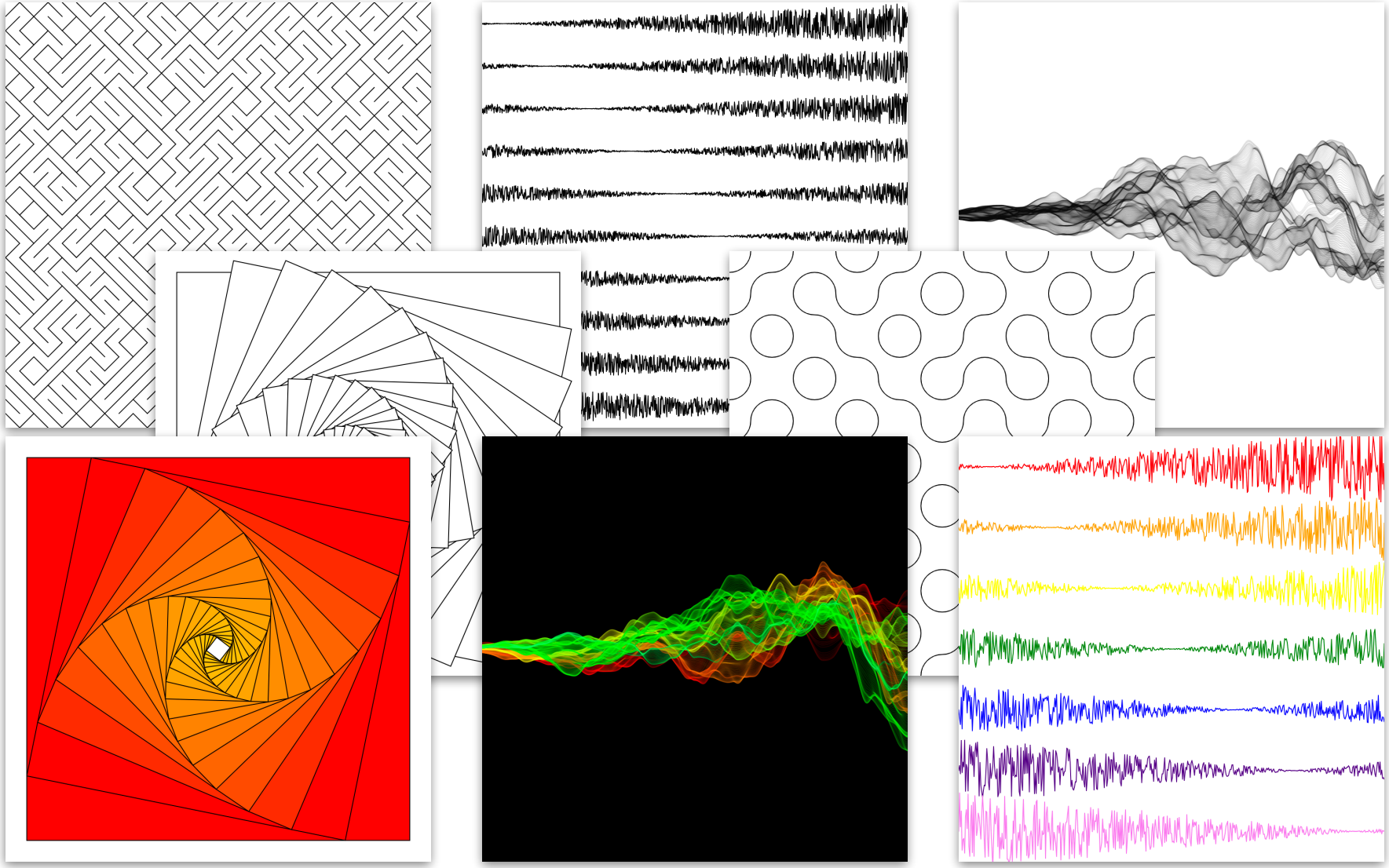
Støy

Buer

Former

Farger

Tid



Mer

Interagere med musepeker med `p5.mouseX` og `p5.mouseY`

Typografi

Bezier-kurver

3D

Hva skjer nå?

Lenker

p5.js web editor:
https://editor.p5js.org/

Sondres Superkule Github Repo™ + slides
https://github.com/bekk/p5-gen-art-workshop

p5.js dokumentasjon
https://p5js.org/reference/

p5.js eksempler
https://p5js.org/examples/