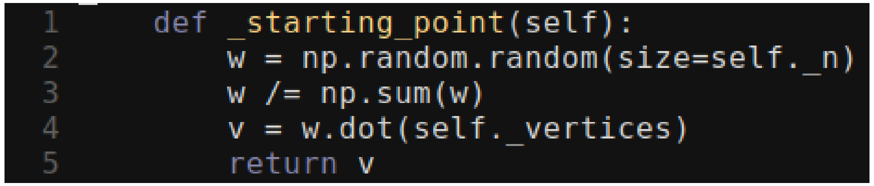
Problemstillingen

- Bruke RNG til å generere fraktaler

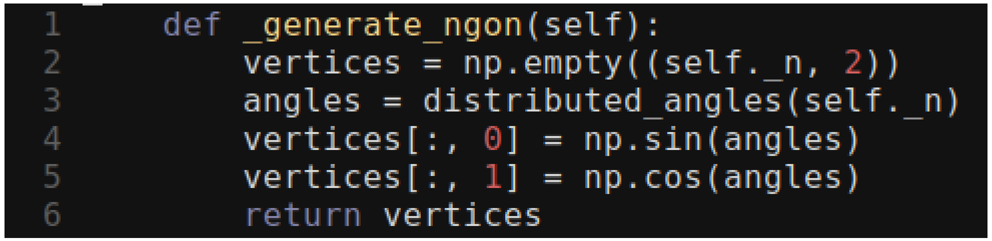
Temaer i IN1910

- Markovprosesser
- Objektorientering
- Gradvis utvikling, lesbarhet
- Testing

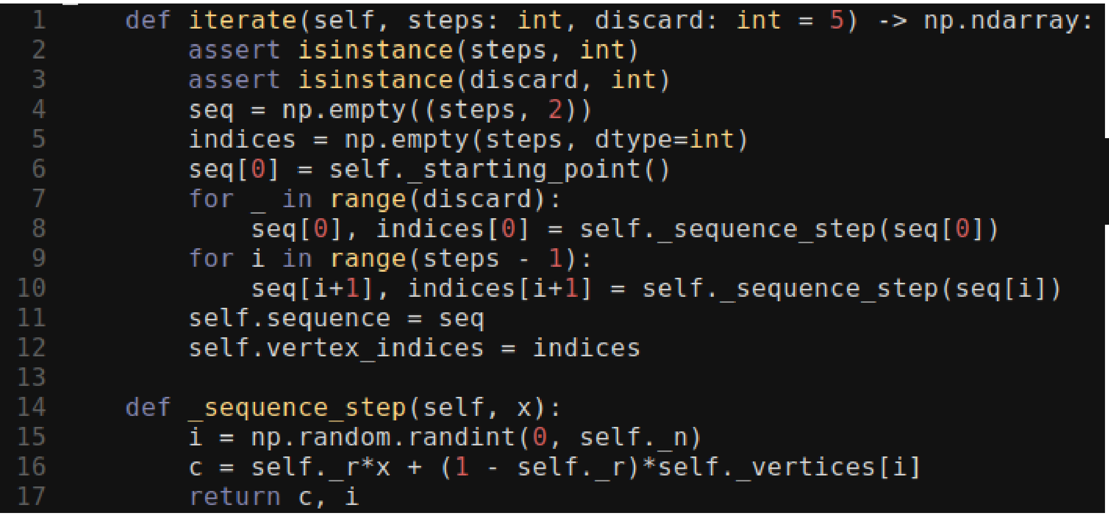
Løsning



```python
    def _starting_point(self):
        w = np.random.random(size=self._n)
        w /= np.sum(w)
        v = w.dot(self._vertices)
        return v
```

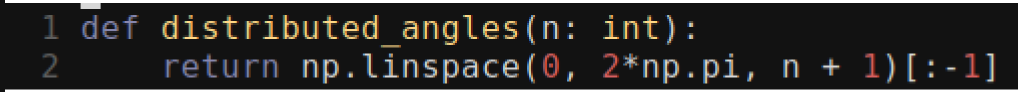


```python
    def _generate_ngon(self):
        vertices = np.empty((self._n, 2))
        angles = distributed_angles(self._n)
        vertices[:, 0] = np.sin(angles)
        vertices[:, 1] = np.cos(angles)
        return vertices
```



```python
    def iterate(self, steps: int, discard: int = 5) -> np.ndarray:
        assert isinstance(steps, int)
        assert isinstance(discard, int)
        seq = np.empty((steps, 2))
        indices = np.empty(steps, dtype=int)
        seq[0] = self._starting_point()
        for _ in range(discard):
            seq[0], indices[0] = self._sequence_step(seq[0])
        for i in range(steps - 1):
            seq[i+1], indices[i+1] = self._sequence_step(seq[i])
        self.sequence = seq
        self.vertex_indices = indices

    def _sequence_step(self, x):
        i = np.random.randint(0, self._n)
        c = self._r*x + (1 - self._r)*self._vertices[i]
        return c, i
```



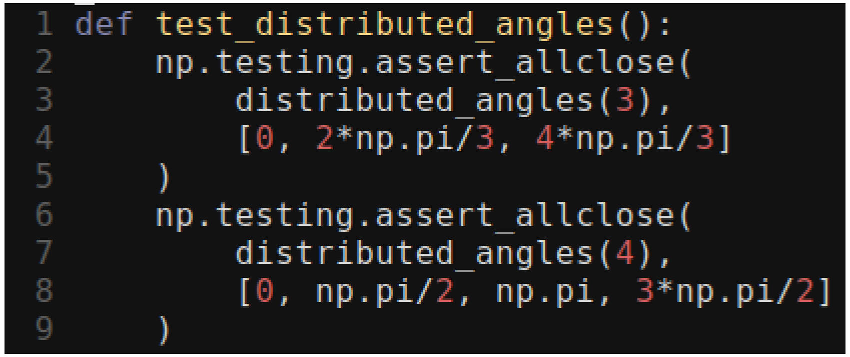
```python
def distributed_angles(n: int):
    return np.linspace(0, 2*np.pi, n + 1)[:-1]
```

Utfordringer

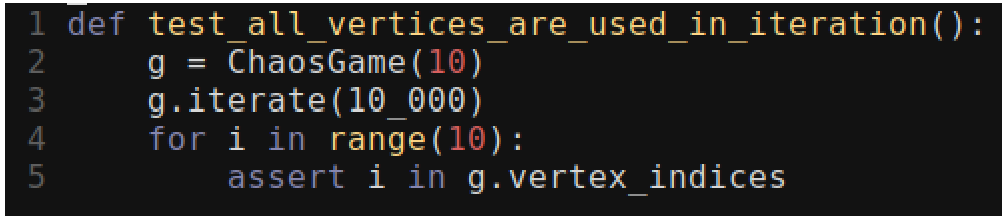
- Større frihet enn andre prosjekter
  - Større ansvar
- Modulært design som lar seg teste

Testing

- Unit tests
- Får mønstre som algoritmene er designet for :)



```python
def test_distributed_angles():
    np.testing.assert_allclose(
        distributed_angles(3),
        [0, 2*np.pi/3, 4*np.pi/3]
    )
    np.testing.assert_allclose(
        distributed_angles(4),
        [0, np.pi/2, np.pi, 3*np.pi/2]
    )
```



```python
def test_all_vertices_are_used_in_iteration():
    g = ChaosGame(10)
    g.iterate(10_000)
    for i in range(10):
        assert i in g.vertex_indices
```