▾ Project 1 | Sensing & Planning for Autonomous Vehicles

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Roll No. : EE22MTECH02003

```python
import numpy as np
import matplotlib.pyplot as plt

def bayes_filter(bel_x, d):
  bel_x_dash = np.zeros(101)
  n = 0

  # action update
  for i in range(101):
    for j in range(101):

      if (i - j) == 1:
        prob = 0.9
      elif (i - j) == 0 or (i - j) == 2:
        prob = 0.05
      else:
        prob = 0

      bel_x_dash[i] += prob*bel_x[j]

  # measurement update
  for i in range(101):

    likelihood = 0.9 if (i - d) == 1 else (0.1/100)
    bel_x_dash[i] = likelihood * bel_x_dash[i]
    n += bel_x_dash[i]

  bel_x_dash = bel_x_dash/n

  return bel_x_dash

# initializing belief with uniform distribution
bel_x = np.ones(101) * (1/101)

for i in range(50):
  # action update => measurement update
  bel_x = bayes_filter(bel_x, i)
  plt.plot(bel_x)
  plt.title(f"Iteration {i + 1}")
  plt.show()
```
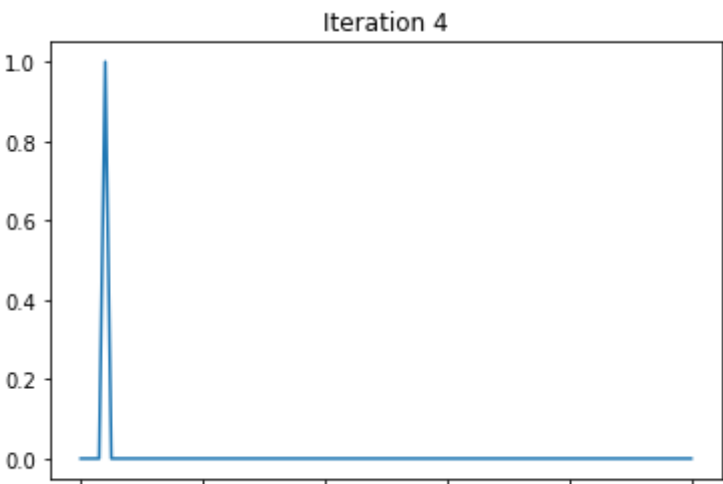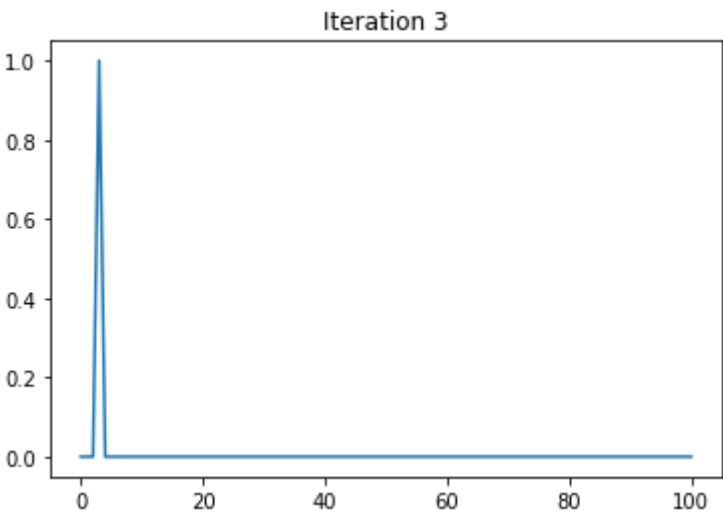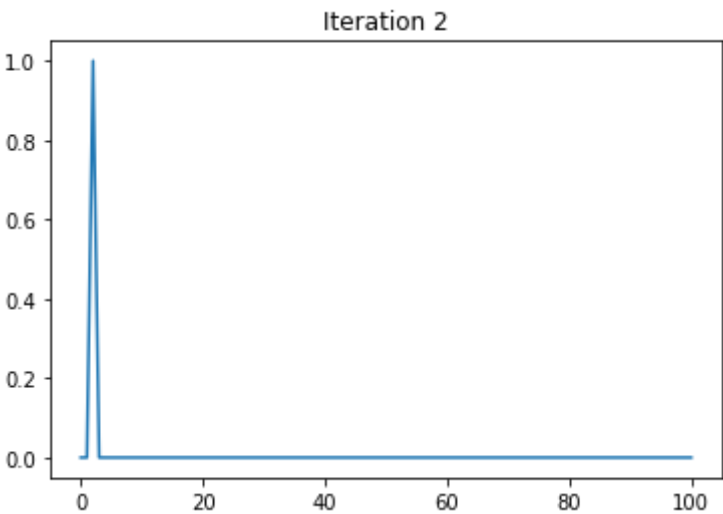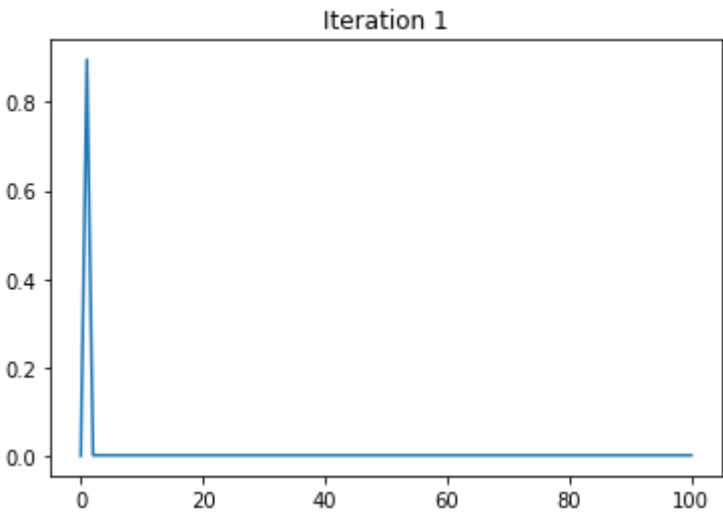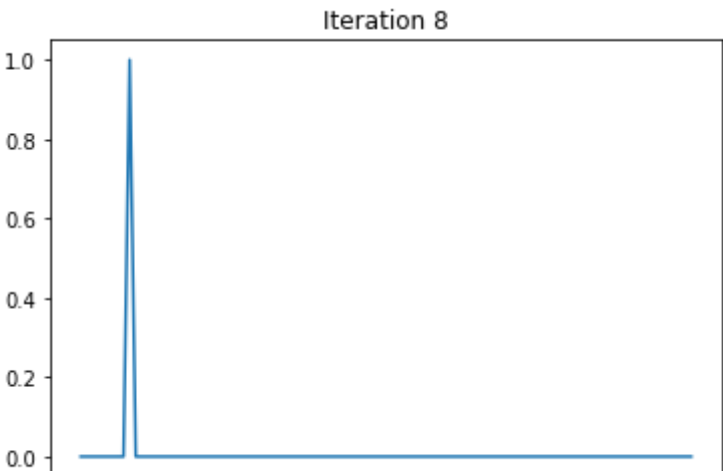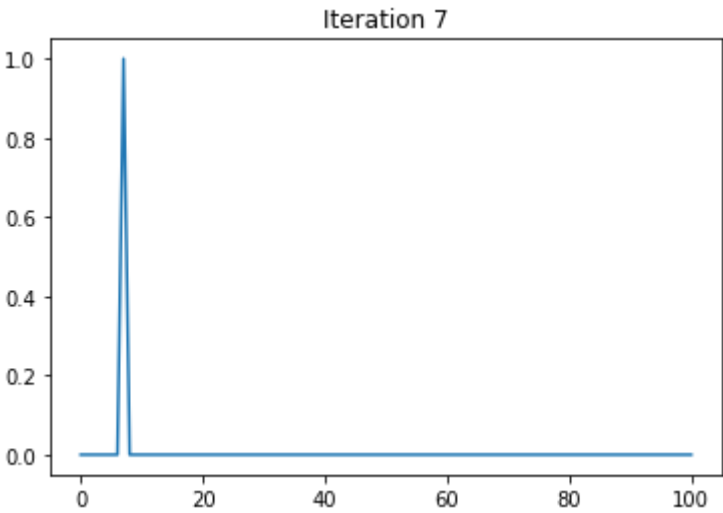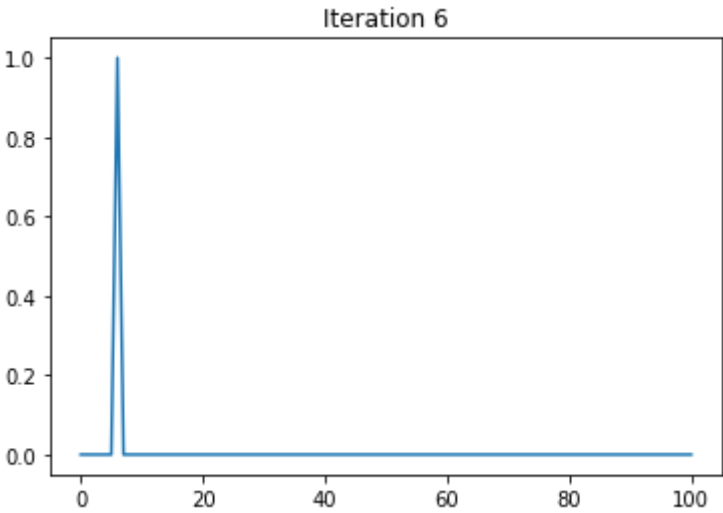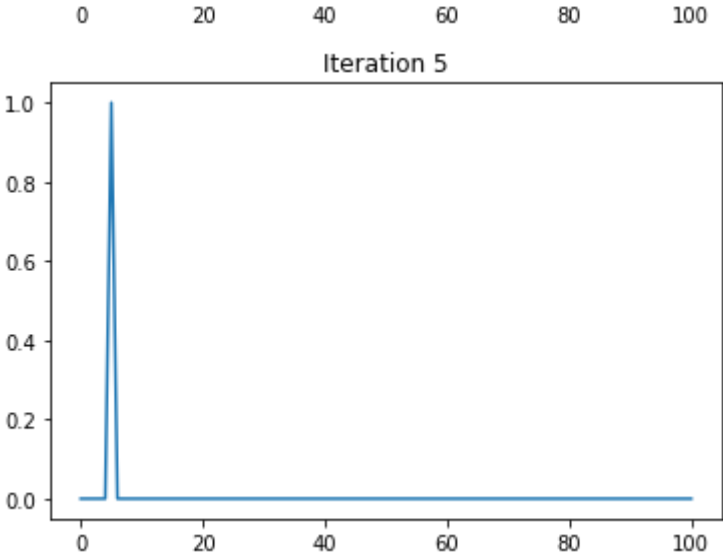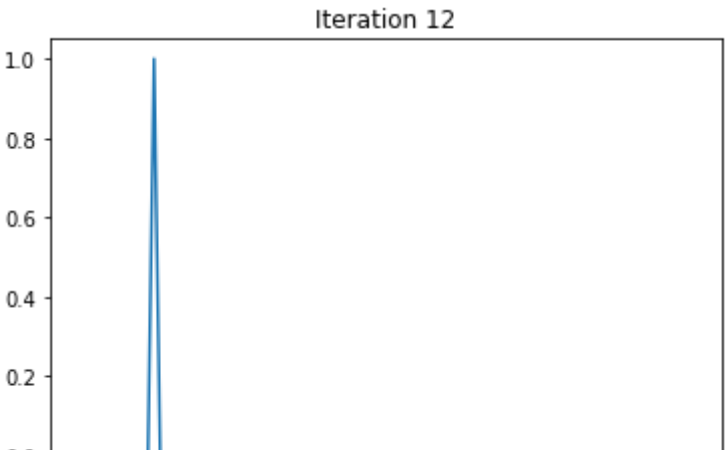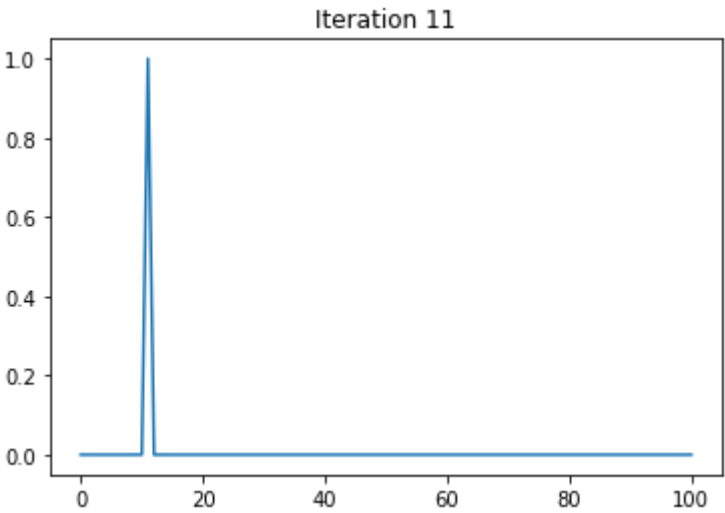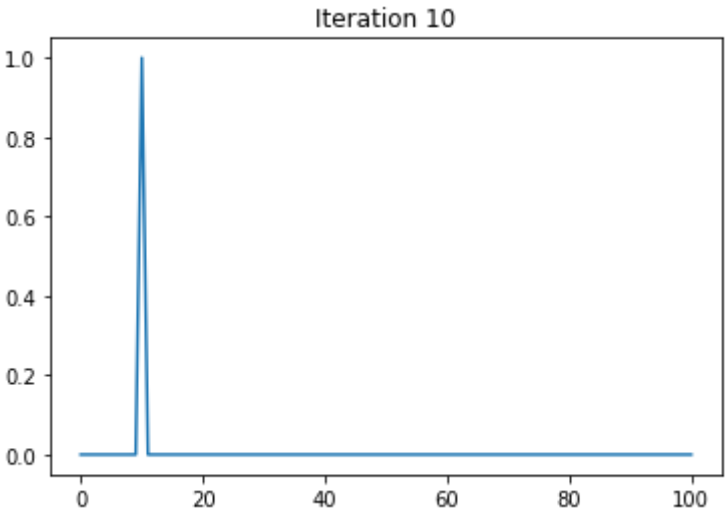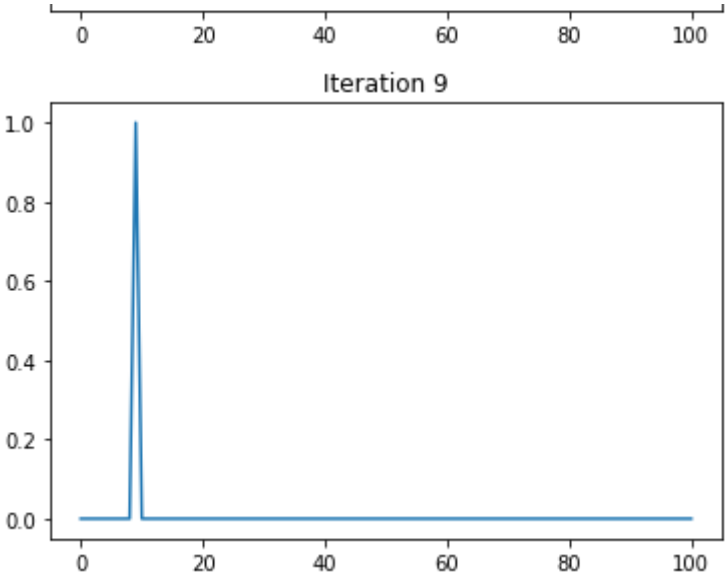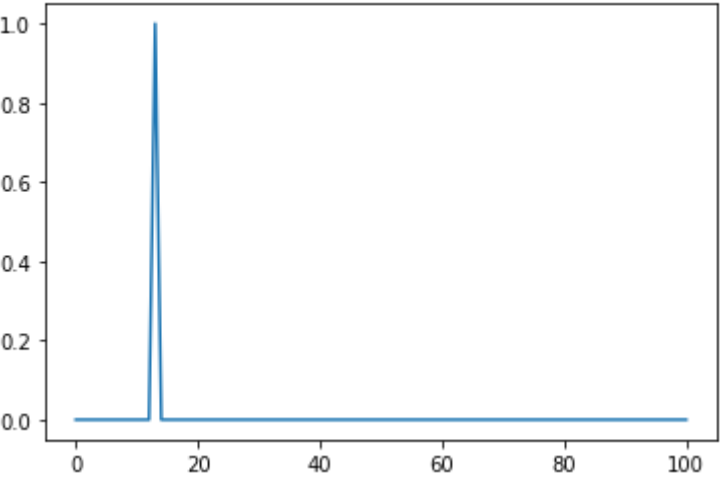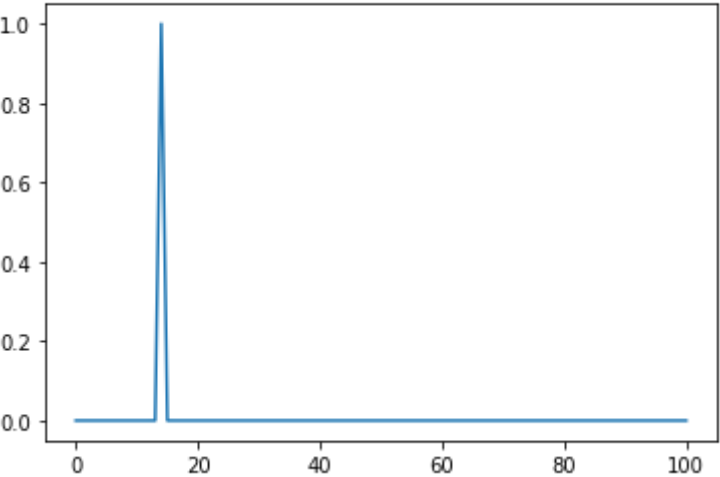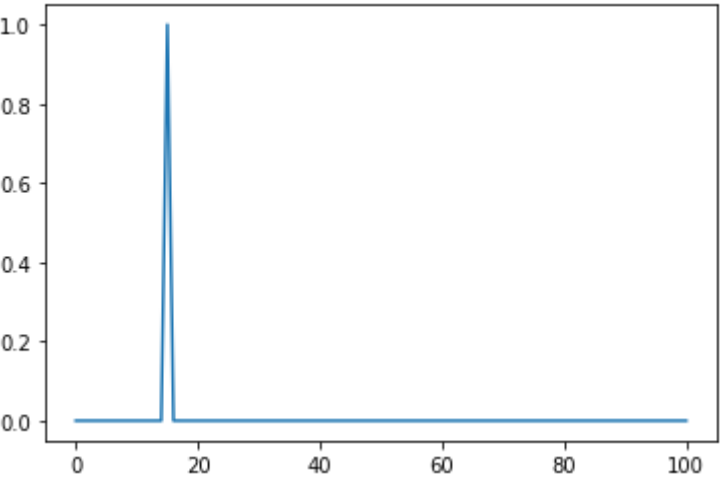
Iteration 1

Iteration 2

Iteration 3

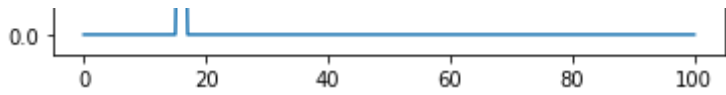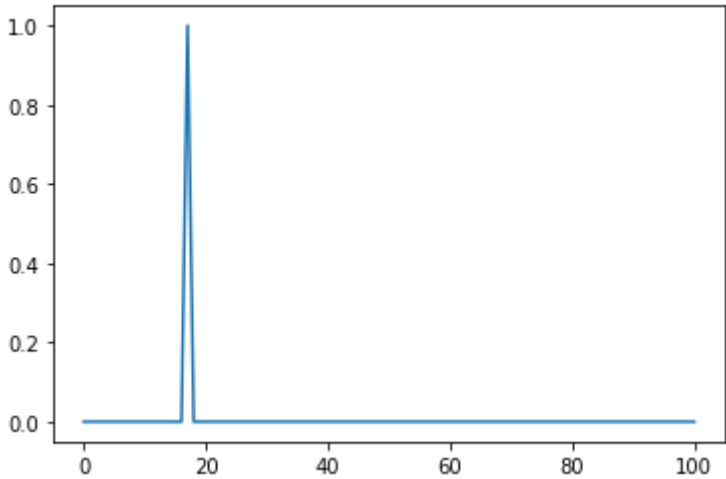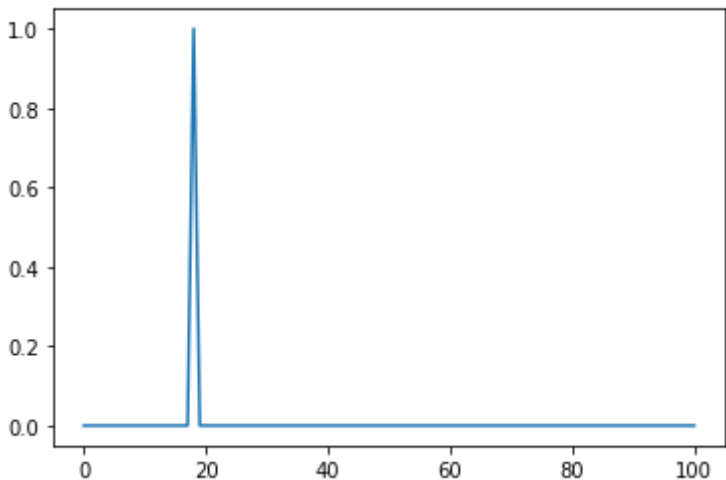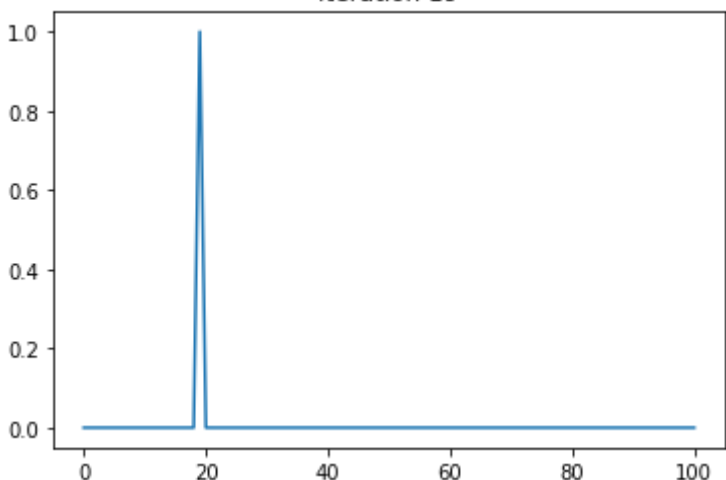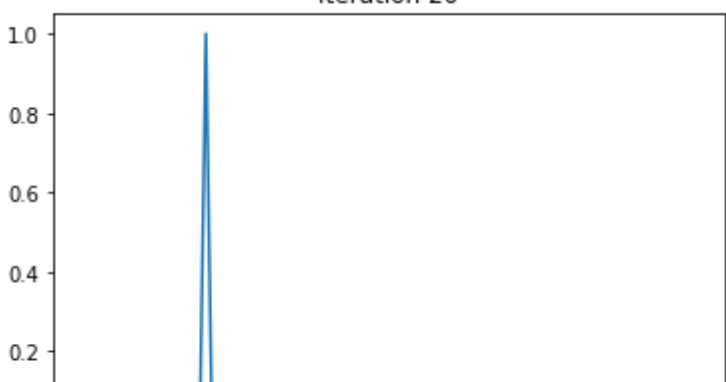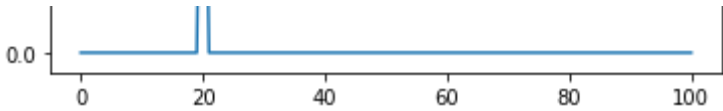## Iteration 4

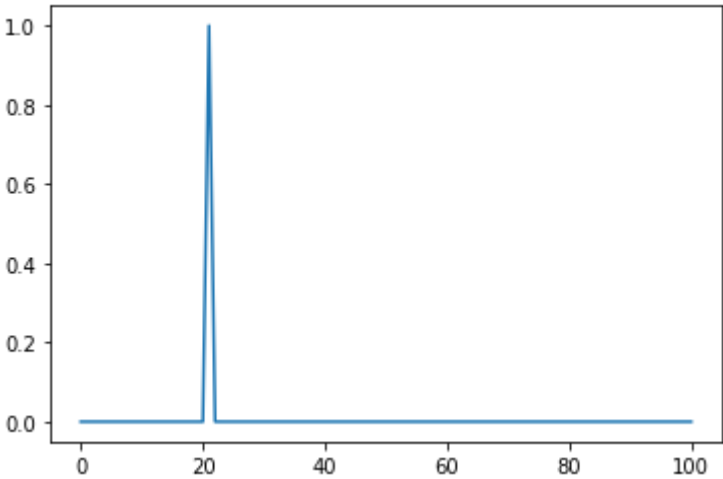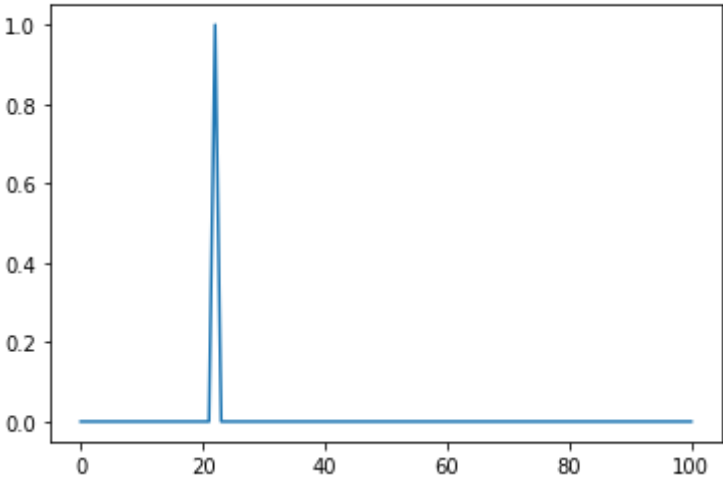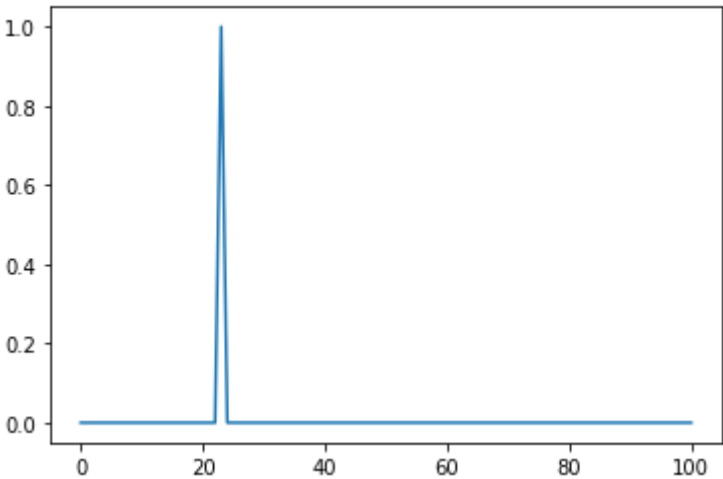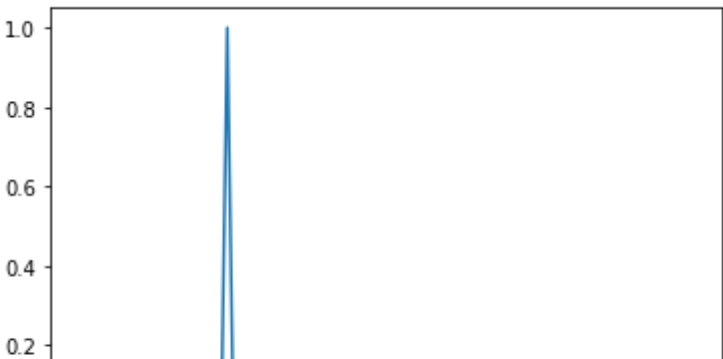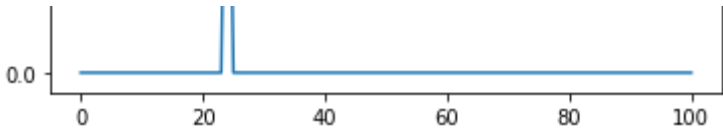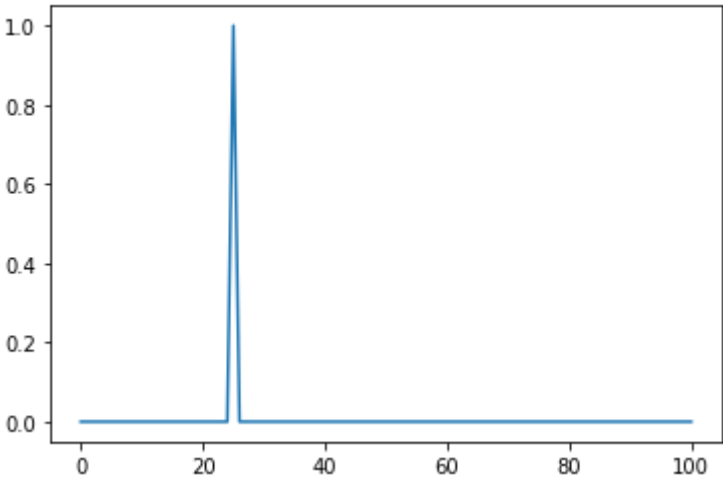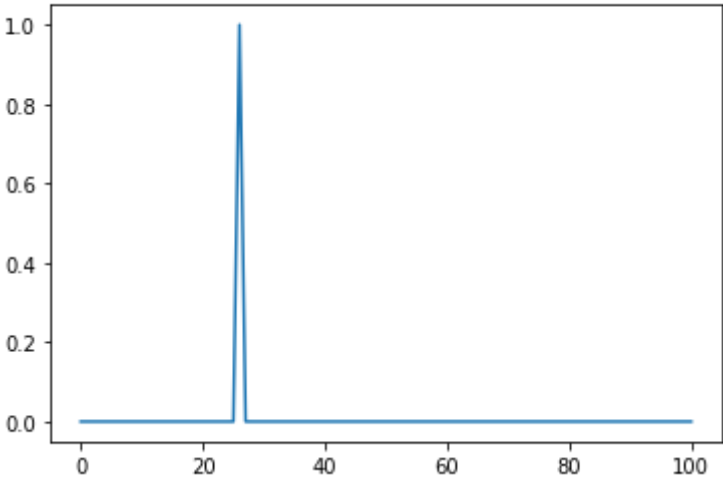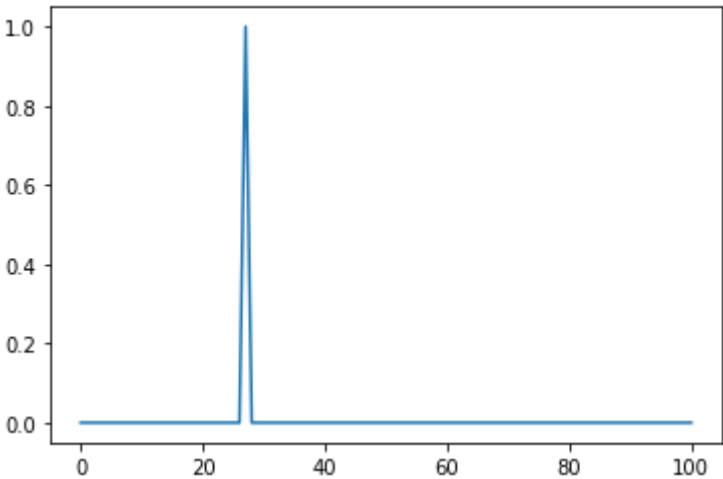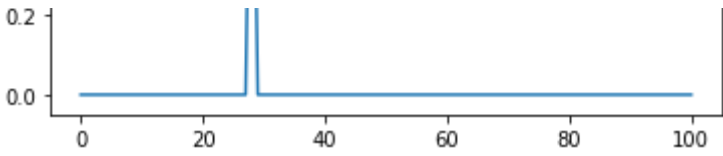### Iteration 5

Iteration 6

Iteration 7

Iteration 8

Iteration 9

Iteration 10

Iteration 11

Iteration 12

Iteration 13

Iteration 14

Iteration 15

Iteration 16

Iteration 17

Iteration 18

Iteration 19

Iteration 20

Iteration 21

Iteration 22

Iteration 23

Iteration 24
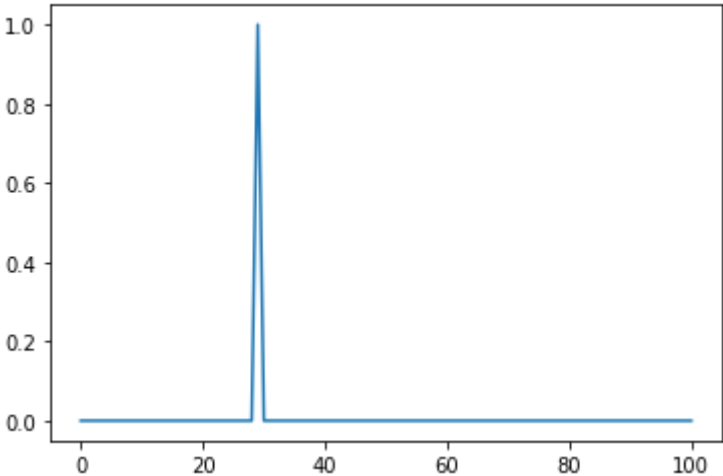
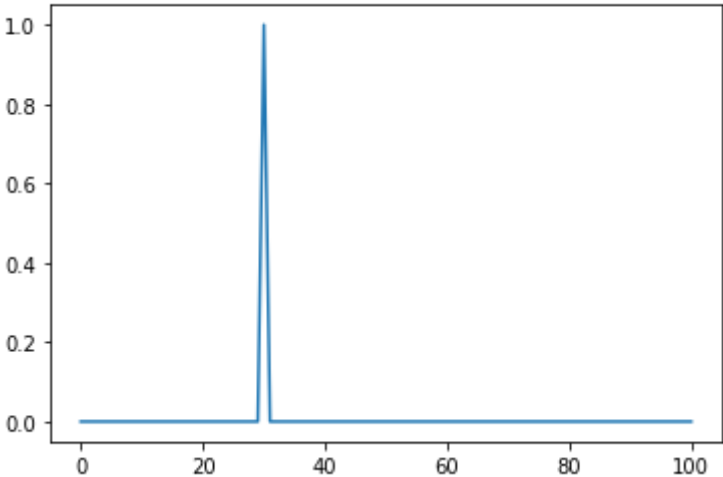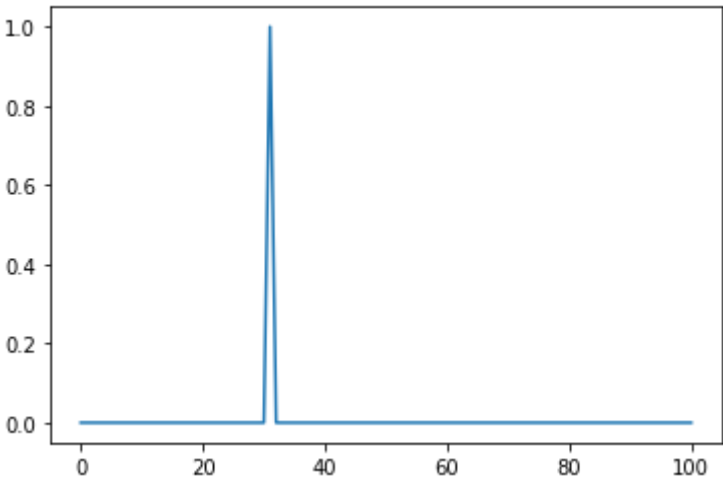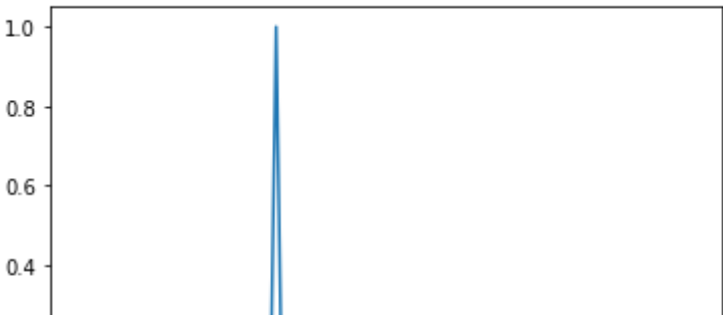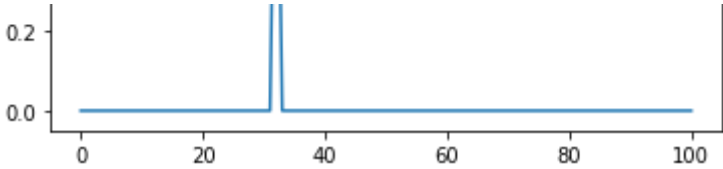### Iteration 25

Iteration 26

Iteration 27

Iteration 28

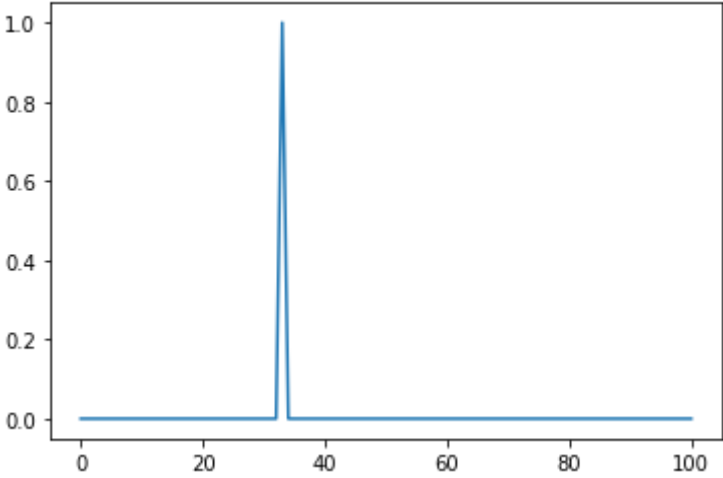Iteration 29

Iteration 30

Iteration 31

Iteration 32
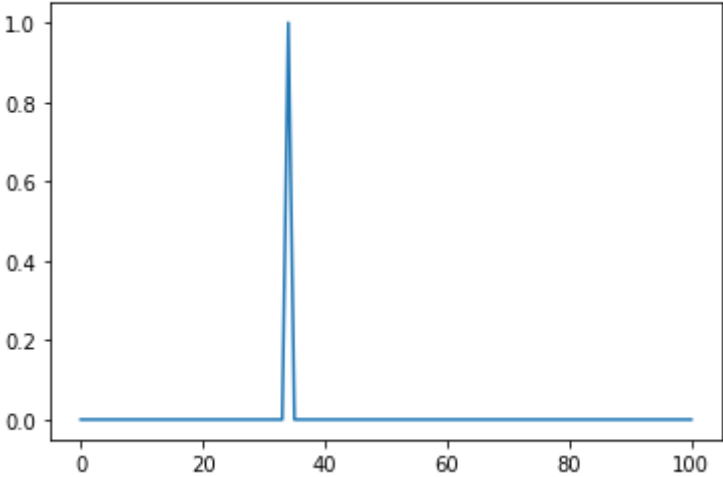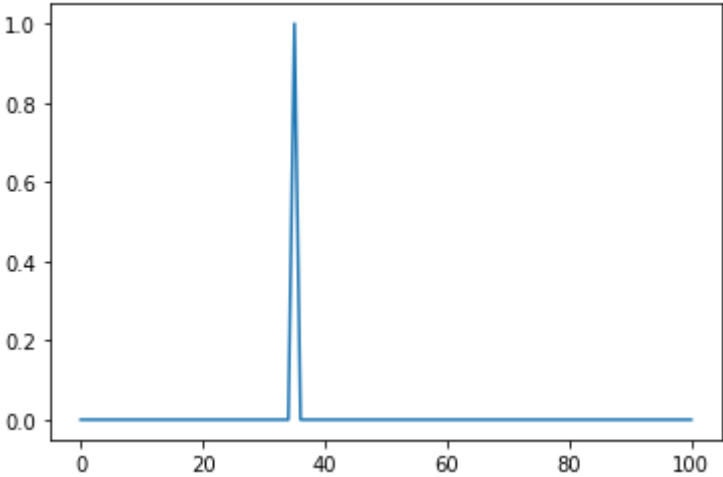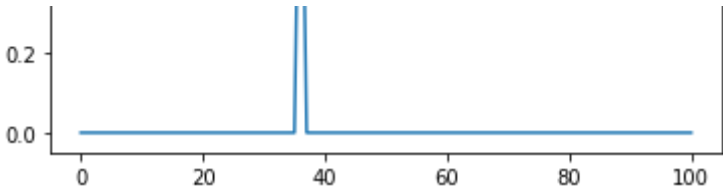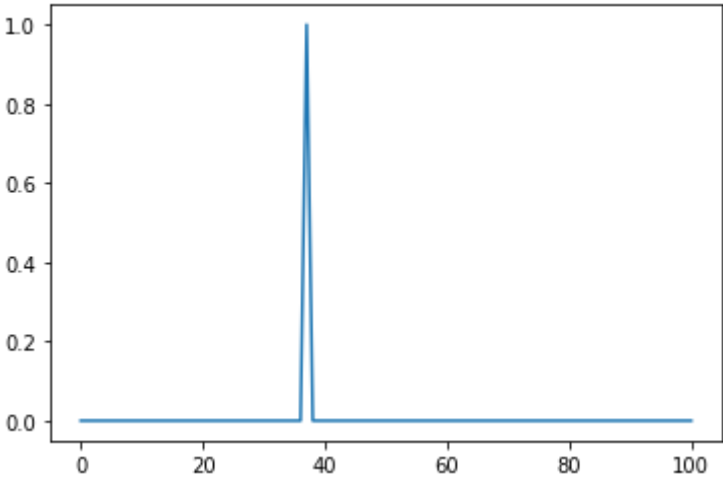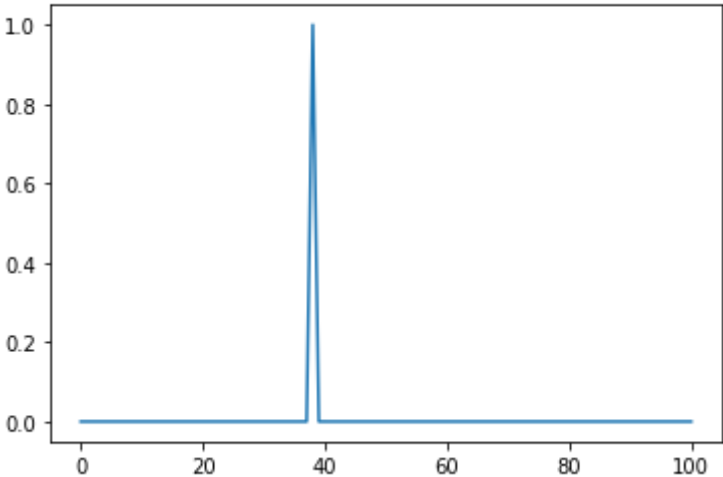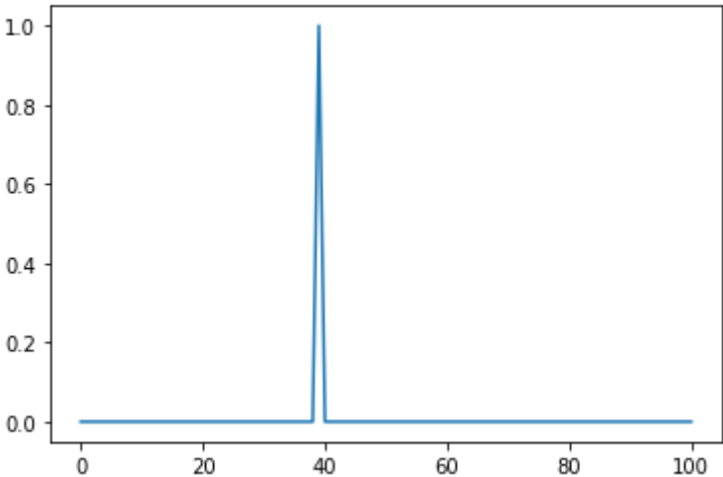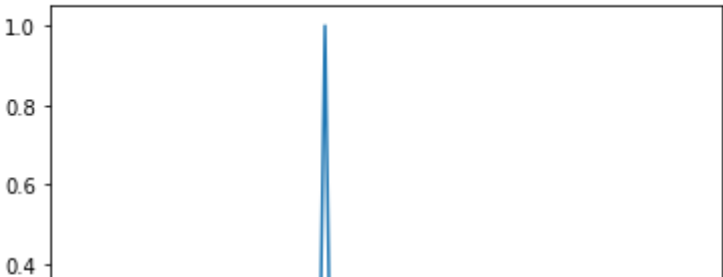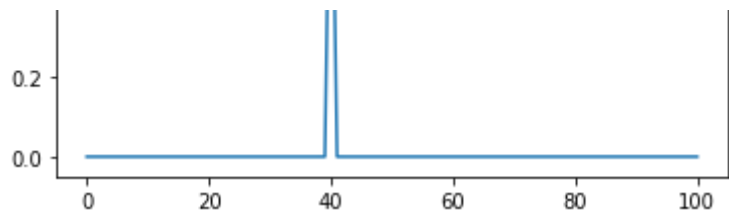
Iteration 33

Iteration 34

Iteration 35
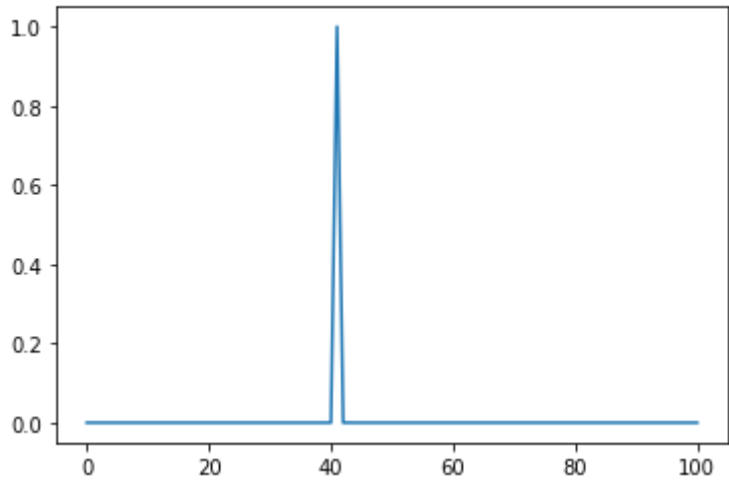

Iteration 36

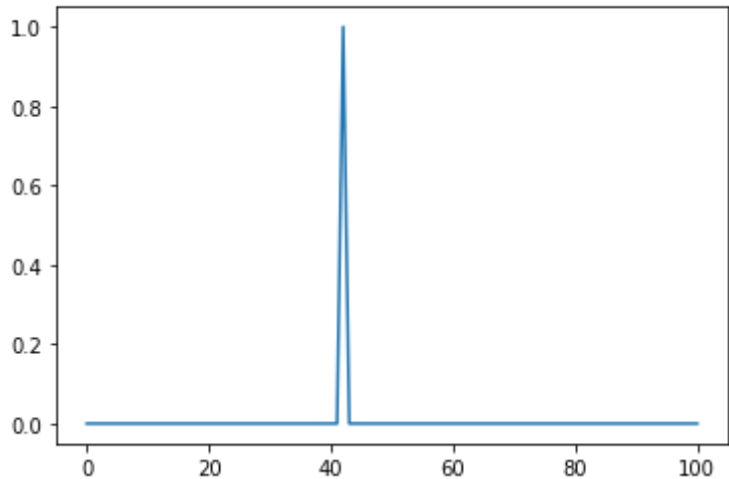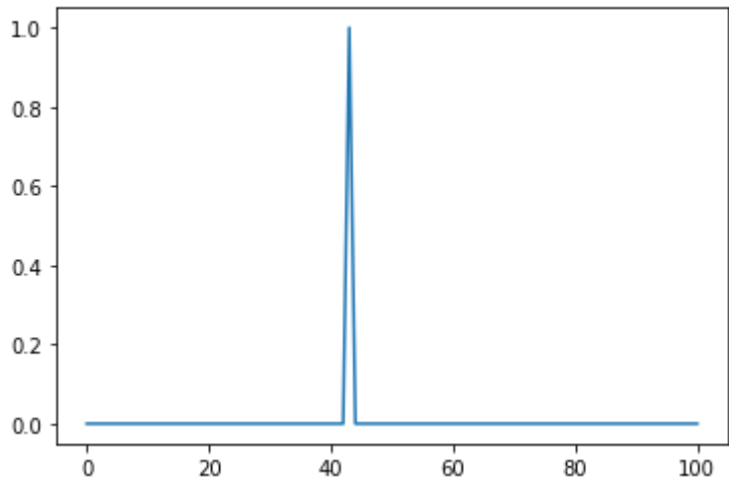## Iteration 37

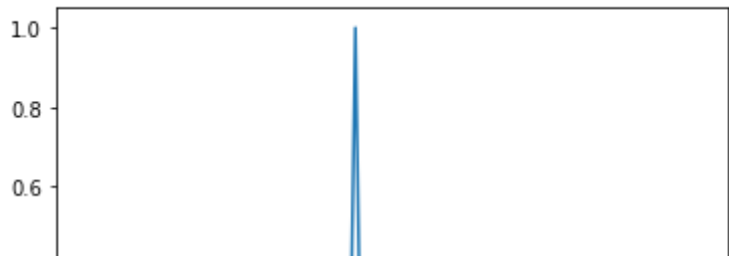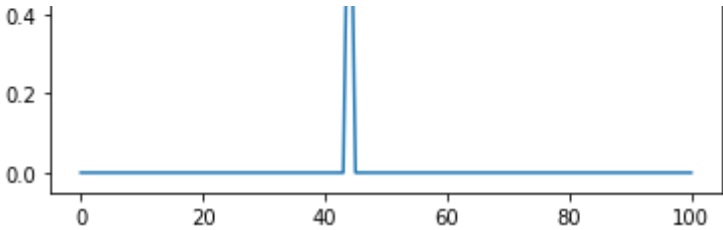## Iteration 38

Iteration 39

Iteration 40

Iteration 41

Iteration 42

Iteration 43

Iteration 44

Iteration 45

Iteration 46

Iteration 47

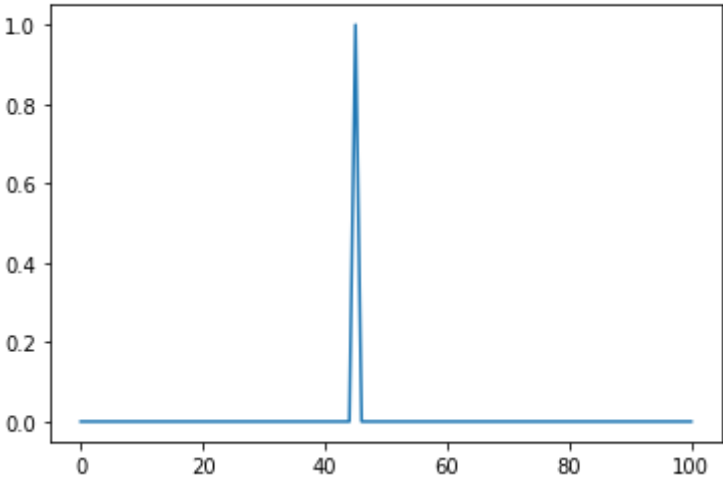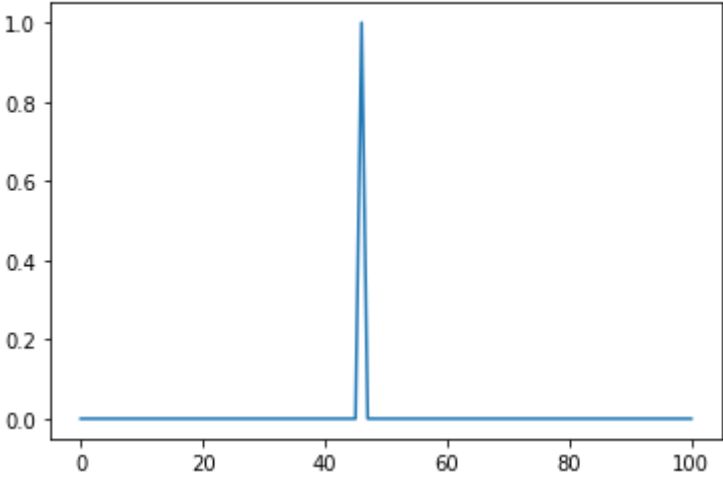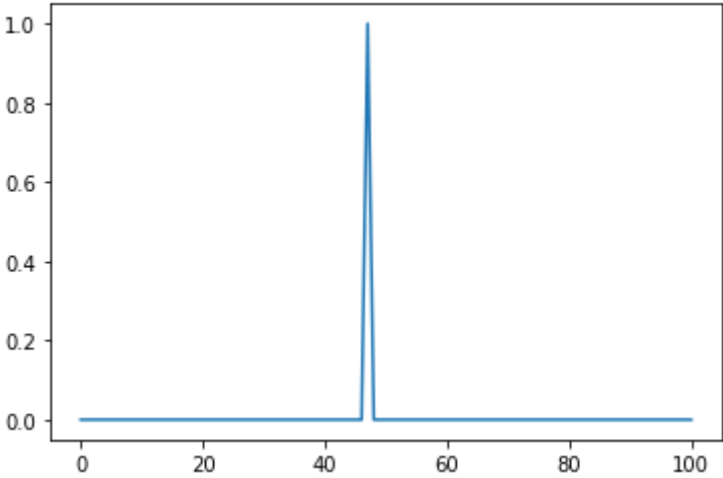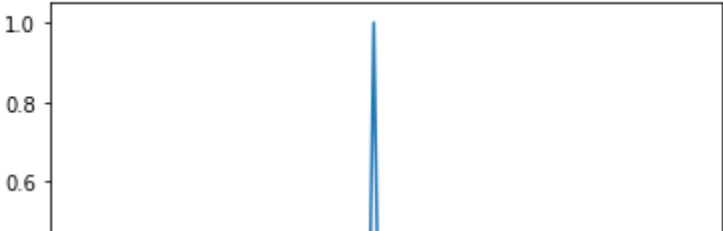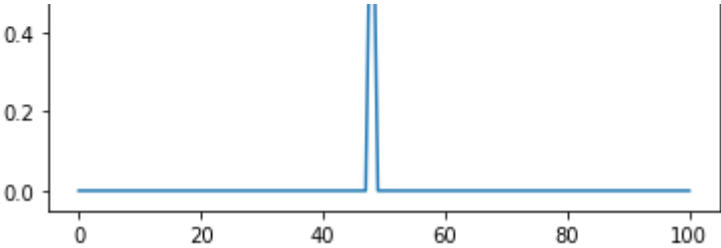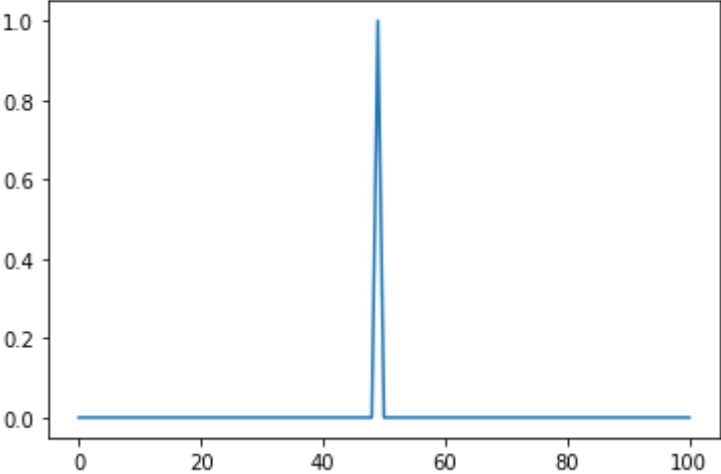### Iteration 48

Iteration 49

Iteration 50

✓ 7s   completed at 22:24