```
import numpy as np
import random


features = np.array([1,2,3,5,6,7])
labels = np.array([155, 197, 244, 356,407,448])
print(features)
print(labels)

#price_per_room: weight
#num_rooms: Features
# base_price: Bias
```

```
[1 2 3 5 6 7]
[155 197 244 356 407 448]
```

```
def simple_trick(base_price, price_per_room, num_rooms, price, l1, l2):
    predicted_price = base_price + price_per_room * num_rooms
    if price > predicted_price and num_rooms > 0:
        price_per_room += l1
        base_price += l2
    if price > predicted_price and num_rooms < 0:
        price_per_room -= l1
        base_price += l2
    if price < predicted_price and num_rooms > 0:
        price_per_room -= l1
        base_price -= l2
    if price < predicted_price and num_rooms < 0:
        price_per_room -= l1
        base_price += l2
    return price_per_room, base_price



def absolute_trick(base_price, price_per_room, num_rooms, price, learning_rate)
    predicted_price = base_price + price_per_room*num_rooms
    if price > predicted_price:
        price_per_room += learning_rate*num_rooms
        base_price += learning_rate
    else:
        price_per_room -= learning_rate*num_rooms
        base_price -= learning_rate
    return price_per_room, base_price
```

```
def square_trick(base_price, price_per_room, num_rooms, price, learning_rate):
    predicted_price = base_price + price_per_room*num_rooms
    price_per_room += learning_rate*num_rooms*(price-predicted_price)
    base_price += learning_rate*(price-predicted_price)
    return price_per_room, base_price


random.seed(0)
def linear_regression(features, labels, learning_rate, epochs ):
    price_per_room = random.random()
    base_price = random.random()
    for epoch in range(epochs):
        if True:
          i = random.randint(0, len(features)-1)
          num_rooms = features[i]
          price = labels[i]
          price_per_room, base_price = simple_trick(base_price, price_per_room,
          #price_per_room, base_price = absolute_trick(base_price,price_per_roo
          #price_per_room, base_price = square_trick(base_price,price_per_room,
          print(f"Epoch {epoch+1}: base_price={base_price:.2f}, price_per_room=
    print('Price per room:', price_per_room)
    print('Base price:', base_price)

linear_regression(features, labels, learning_rate = 0.01, epochs = 1000)
```

```
Epoch 3: base_price=0.88, price_per_room=1.26
Epoch 4: base_price=0.92, price_per_room=1.40
Epoch 5: base_price=0.96, price_per_room=1.54
Epoch 6: base_price=1.00, price_per_room=1.68
Epoch 7: base_price=1.04, price_per_room=1.82
Epoch 8: base_price=1.08, price_per_room=1.96
Epoch 9: base_price=1.12, price_per_room=2.10
Epoch 10: base_price=1.16, price_per_room=2.24
Epoch 11: base_price=1.20, price_per_room=2.38
Epoch 12: base_price=1.24, price_per_room=2.52
Epoch 13: base_price=1.28, price_per_room=2.66
Epoch 14: base_price=1.32, price_per_room=2.80
Epoch 15: base_price=1.36, price_per_room=2.94
Epoch 16: base_price=1.40, price_per_room=3.08
Epoch 17: base_price=1.44, price_per_room=3.22
Epoch 18: base_price=1.48, price_per_room=3.36
Epoch 19: base_price=1.52, price_per_room=3.50
Epoch 20: base_price=1.56, price_per_room=3.64
Epoch 21: base_price=1.60, price_per_room=3.78
Epoch 22: base_price=1.64, price_per_room=3.92
Epoch 23: base_price=1.68, price_per_room=4.06
Epoch 24: base_price=1.72, price_per_room=4.20
Epoch 25: base_price=1.76, price_per_room=4.34
Epoch 26: base_price=1.80, price_per_room=4.48
Epoch 27: base_price=1.84, price_per_room=4.62
Epoch 28: base_price=1.88, price_per_room=4.76
```

```
Epoch 29: base_price=1.92, price_per_room=4.90
Epoch 30: base_price=1.96, price_per_room=5.04
Epoch 31: base_price=2.00, price_per_room=5.18
Epoch 32: base_price=2.04, price_per_room=5.32
Epoch 33: base_price=2.08, price_per_room=5.46
Epoch 34: base_price=2.12, price_per_room=5.60
Epoch 35: base_price=2.16, price_per_room=5.74
Epoch 36: base_price=2.20, price_per_room=5.88
Epoch 37: base_price=2.24, price_per_room=6.02
Epoch 38: base_price=2.28, price_per_room=6.16
Epoch 39: base_price=2.32, price_per_room=6.30
Epoch 40: base_price=2.36, price_per_room=6.44
Epoch 41: base_price=2.40, price_per_room=6.58
Epoch 42: base_price=2.44, price_per_room=6.72
Epoch 43: base_price=2.48, price_per_room=6.86
Epoch 44: base_price=2.52, price_per_room=7.00
Epoch 45: base_price=2.56, price_per_room=7.14
Epoch 46: base_price=2.60, price_per_room=7.28
Epoch 47: base_price=2.64, price_per_room=7.42
Epoch 48: base_price=2.68, price_per_room=7.56
Epoch 49: base_price=2.72, price_per_room=7.70
Epoch 50: base_price=2.76, price_per_room=7.84
Epoch 51: base_price=2.80, price_per_room=7.98
Epoch 52: base_price=2.84, price_per_room=8.12
Epoch 53: base_price=2.88, price_per_room=8.26
Epoch 54: base_price=2.92, price_per_room=8.40
Epoch 55: base_price=2.96, price_per_room=8.54
Epoch 56: base_price=3.00, price_per_room=8.68
Epoch 57: base_price=3.04, price_per_room=8.82
Epoch 58: base_price=3.08, price_per_room=8.96
Epoch 59: base_price=3.12, price_per_room=9.10
Epoch 60: base_price=3.16, price_per_room=9.24
Epoch 61: base_price=3.20, price_per_room=9.38
Epoch 62: base_price=3.24, price_per_room=9.52
```

```
random.seed(0)
def gradient_descent(features, labels, learning_rate, epochs):
    price_per_room = 0.0
    base_price = 0.0
    n = len(features)

    for epoch in range(epochs):
        for i in range(n):
            predicted = base_price + price_per_room * features[i]
            error = labels[i] - predicted

            d_price_per_room = -2 * features[i] * error
            d_base_price = -2 * error

            price_per_room -= learning_rate * d_price_per_room
            base_price -= learning_rate * d_base_price
```

```
        print(f"Epoch {epoch+1}: base_price={base_price:.2f}, price_per_room={p

    return price_per_room, base_price

price_per_room, base_price = gradient_descent(features, labels, learning_rate=0
print(f"Final model: price = {base_price:.2f} + {price_per_room:.2f} ")
```

```
Epoch 79: base_price=92.22, price_per_room=50.83
Epoch 80: base_price=92.49, price_per_room=50.79
Epoch 81: base_price=92.75, price_per_room=50.75
Epoch 82: base_price=93.00, price_per_room=50.71
Epoch 83: base_price=93.25, price_per_room=50.68
Epoch 84: base_price=93.49, price_per_room=50.64
Epoch 85: base_price=93.72, price_per_room=50.61
Epoch 86: base_price=93.95, price_per_room=50.58
Epoch 87: base_price=94.17, price_per_room=50.55
Epoch 88: base_price=94.39, price_per_room=50.52
Epoch 89: base_price=94.59, price_per_room=50.49
Epoch 90: base_price=94.80, price_per_room=50.46
Epoch 91: base_price=95.00, price_per_room=50.43
Epoch 92: base_price=95.19, price_per_room=50.40
Epoch 93: base_price=95.38, price_per_room=50.37
Epoch 94: base_price=95.56, price_per_room=50.35
Epoch 95: base_price=95.74, price_per_room=50.32
Epoch 96: base_price=95.91, price_per_room=50.30
Epoch 97: base_price=96.08, price_per_room=50.27
Epoch 98: base_price=96.24, price_per_room=50.25
Epoch 99: base_price=96.40, price_per_room=50.23
Epoch 100: base_price=96.55, price_per_room=50.21
Epoch 101: base_price=96.70, price_per_room=50.19
Epoch 102: base_price=96.85, price_per_room=50.16
Epoch 103: base_price=96.99, price_per_room=50.14
Epoch 104: base_price=97.13, price_per_room=50.12
Epoch 105: base_price=97.27, price_per_room=50.10
Epoch 106: base_price=97.40, price_per_room=50.09
Epoch 107: base_price=97.52, price_per_room=50.07
Epoch 108: base_price=97.65, price_per_room=50.05
Epoch 109: base_price=97.77, price_per_room=50.03
Epoch 110: base_price=97.89, price_per_room=50.02
Epoch 111: base_price=98.00, price_per_room=50.00
Epoch 112: base_price=98.11, price_per_room=49.98
Epoch 113: base_price=98.22, price_per_room=49.97
Epoch 114: base_price=98.33, price_per_room=49.95
Epoch 115: base_price=98.43, price_per_room=49.94
Epoch 116: base_price=98.53, price_per_room=49.92
Epoch 117: base_price=98.62, price_per_room=49.91
Epoch 118: base_price=98.72, price_per_room=49.90
Epoch 119: base_price=98.81, price_per_room=49.88
Epoch 120: base_price=98.90, price_per_room=49.87
Epoch 121: base_price=98.99, price_per_room=49.86
Epoch 122: base_price=99.07, price_per_room=49.85
Epoch 123: base_price=99.15, price_per_room=49.84
Epoch 124: base_price=99.23, price_per_room=49.82
```

```
Epoch 125: base_price=99.31, price_per_room=49.81
Epoch 126: base_price=99.39, price_per_room=49.80
Epoch 127: base_price=99.46, price_per_room=49.79
Epoch 128: base_price=99.53, price_per_room=49.78
Epoch 129: base_price=99.60, price_per_room=49.77
Epoch 130: base_price=99.67, price_per_room=49.76
Epoch 131: base_price=99.74, price_per_room=49.75
Epoch 132: base_price=99.80, price_per_room=49.74
Epoch 133: base_price=99.86, price_per_room=49.73
Epoch 134: base_price=99.92, price_per_room=49.73
Epoch 135: base_price=99.98, price_per_room=49.72
Epoch 136: base_price=100.04, price_per_room=49.71
Epoch 137: base_price=100.10, price_per_room=49.70
```

Start coding or generate with AI.