Regression in Practice: A Python Practicum Lecture 6b – 2021-06-16

MAT A35 – Summer 2021 – UTSC

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Try it out: Python basics

```
x = 123
y = 234
z = 345
print(x / y * z - x)
```

```
print(x / y * z - x^2)
```

A: 42
B: 50.29619392032321
C: 58.34615384615384
D: TypeError
E: None of the above

Try it out: numpy

- import numpy as np
- X = np.array([1,2,3,4,5])
- Y = X
- print(X*Y)

A: 54

B: [1 4 9 16 25]

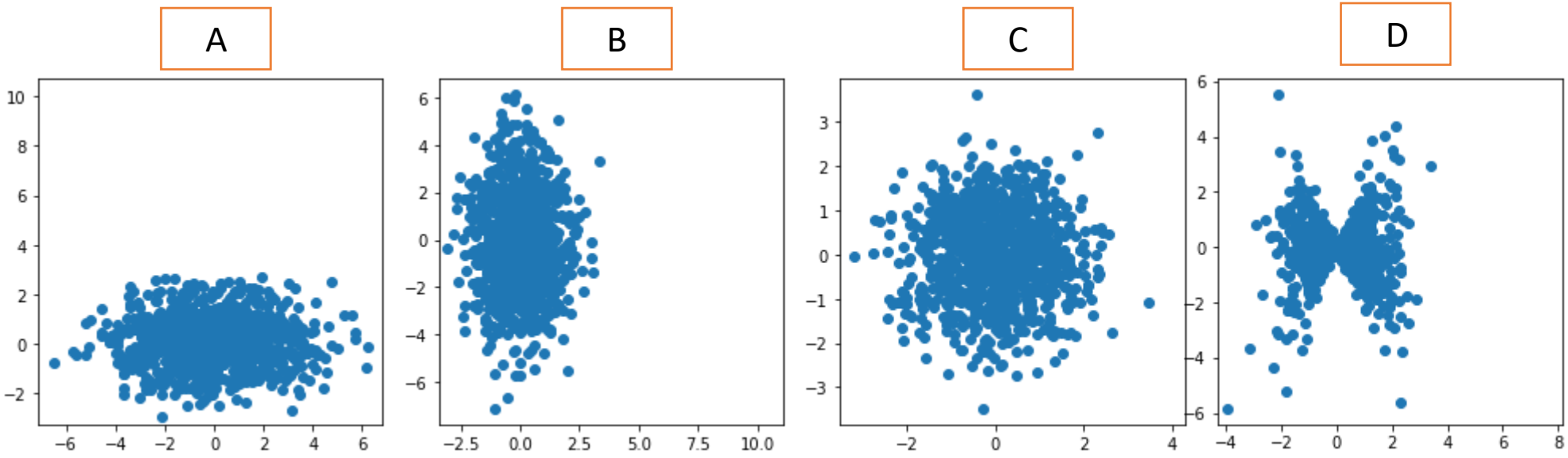
C:
$$\begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 4 & 6 & 8 & 10 \\ 3 & 6 & 9 & 12 & 15 \\ 4 & 8 & 12 & 16 & 20 \\ 5 & 10 & 15 & 20 & 25 \end{bmatrix}$$

D: TypeError

E: None of the above

Try it out: matplotlib

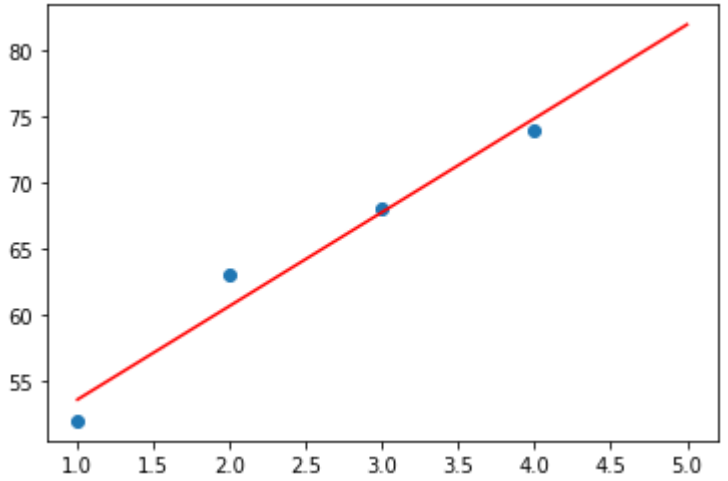
- Xrand = np.random.randn(1000)
- Yrand = np.random.randn(1000)
- plt.scatter(Xrand, Yrand)
- plt.axis('square')
- plt.show()



Try it out: fitting a model

- Suppose Alice is taking MATA35 and has taken the first four quizzes, with marks of 52, 63, 68, and 74 on quizzes 1, 2, 3, and 4 respectively.
- Alice decides to use a linear regression model to predict her score on quiz 5. What does she predict to be her mark?

A: 80
B: 81
C: 82
D: 83
E: None of the above



Polynomial regression

- What if our data doesn’t look linear?

Different types of regression

- Linear regression: $f(x) = mx + b$
- Quadratic regression: $f(x) = m_2x^2 + m_1x + b$
- Cubic regression: $f(x) = m_3x^3 + m_2x^2 + m_1x + b$
- Polynomial regression of degree n:

$$f(x) = b + \sum_{i=1}^{n} m_i x^i$$

- Exponential regression: $f(x) = b + m_0e^{m_1x}$

Be careful about too many parameters

- The more parameters you have (e.g. in a polynomial regression), the better your mean squared error will be.
- However, sometimes, you will overfit to the data.