Exercise 12

Import notebook funcs

```
from notebookfuncs import *
```

12. This problem involves simple linear regression without an intercept.

(a) Recall that the coefficient estimate ˆ for the linear regression of Y onto X without an intercept is given by (3.38). Under what circumstance is the coefficient estimate for the regression of X onto Y the same as the coefficient estimate for the regression of Y onto X?

(b) Generate an example in Python with n = 100 observations in which the coefficient estimate for the regression of X onto Y is different from the coefficient estimate for the regression of Y onto X.

(c) Generate an example in Python with n = 100 observations in which the coefficient estimate for the regression of X onto Y is the same as the coefficient estimate for the regression of Y onto X.

- This has already been proved and shown in my answer to Exercise 11 where the coefficients are calculated as $\rho * \frac{SD(y)}{SD(x)}$ and its inverse.
- The ratios of the standard deviations are inversed when the regressions are inversed.
- When the two variables are standardizebed and have unit variance or SD, then their coefficient estimate $\hat{\beta}$ are the same as the Pearson correlation coefficient ρ.

Examples have been generated for the same in Exercise 11.

```
allDone();
```

```
<IPython.lib.display.Audio object>
```