modules/helpers_sim_lin_reg.py

```python
# -*- coding: utf-8 -*-
"""some helper functions."""
import numpy as np

import numpy as np
from numpy.random import randn
from numpy.random import multivariate_normal
from scipy.linalg import toeplitz

"""some helper functions."""
def simu_linreg(w0, n_samples=1000, corr=0.5, std=0.5):
    """Simulation of a linear regression model with Gaussian features
    and a Toeplitz covariance, with Gaussian noise.

    Parameters
    ----------
    w0 : `numpy.array`, shape=(n_features,)
        Model weights

    n_samples : `int`, default=1000
        Number of samples to simulate

    corr : `float`, default=0.5
        Correlation of the features

    std : `float`, default=0.5
        Standard deviation of the noise

    Returns
    -------
    X : `numpy.ndarray`, shape=(n_samples, n_features)
        Simulated features matrix. It contains samples of a centered
        Gaussian  vector with Toeplitz covariance.

    y : `numpy.array`, shape=(n_samples,)
        Simulated labels
    """
    n_features = w0.shape[0]
    # Construction of a covariance matrix
    cov = toeplitz(corr ** np.arange(0, n_features))
    # Simulation of features
    X = multivariate_normal(np.zeros(n_features), cov, size=n_samples)
    # Simulation of the labels
    y = X.dot(w0) + std * randn(n_samples)
    return X, y
```