1 Analysing an Algorithm

```
def r(coeffs):
    coeffs = np.array(coeffs[:-1])
    n = len(coeffs)
    A = np.eye(n, k = -1)
    A[:,-1] = -coeffs
    lam, v = np.linalg.eig(A)
    return lam
```

1. Which algorithm is implemented in the function above? What role does the parameter `coeffs` play?
2. Which value `lam` will the function return at `coeffs = [-1,0,1]`? (No proof needed)
3. What would the function return at `coeffs = [-1,0,-1]`? Can you give a suggestion for improvement, in order to make the function more robust to bad input data?

Solution:

1. "coeffs" are the coefficients of a polynomial and the function r finds the roots of the polynomial.
2. The corresponding polynomial is $x^2 - 1$. Hence lam$= 1, -1$.
3. In case of $[-1, 0, 1]$ we get the same answer. The case of non-normed polynomials should be handled.