

Exercise 3.4.33

```
V = [1 1 1; 1 2 4; 3 3 9];
```

```
[Q,R] = matrixGS(V)
```

```
Q = 3x3
    0.301511344577764   -0.095346258924559   -0.948683298050514
    0.301511344577764    0.953462589245592   -0.000000000000000
    0.904534033733291   -0.286038776773678    0.316227766016838
R = 3x3
    3.316624790355400    3.618136134933164    9.648363026488436
           0    0.953462589245592    1.144155107094711
           0           0    1.897366596101027
```

Check Result

```
Q*R
```

```
ans = 3x3
     1     1     1
     1     2     4
     3     3     9
```

```
Q*Q'
```

```
ans = 3x3
    1.000000000000000   -0.000000000000000    0.000000000000000
   -0.000000000000000    1.000000000000000   -0.000000000000000
    0.000000000000000   -0.000000000000000    1.000000000000000
```

```
function [V,R] = matrixGS(V)
    m = size(V,2);
    R = zeros(m);
    for k = 1:m
        R(k,k) = norm(V(:,k));
        if R(k,k) == 0
            disp('vectors are lin. dep.')
            return
        end
        V(:,k) = V(:,k) / R(k,k);
        if k==m
            continue
        end
        R(k,k+1:m) = V(:,k)' * V(:,k+1:m);
        V(:,k+1:m) = V(:,k+1:m) - V(:,k)*R(k,k+1:m);
    end
```

end