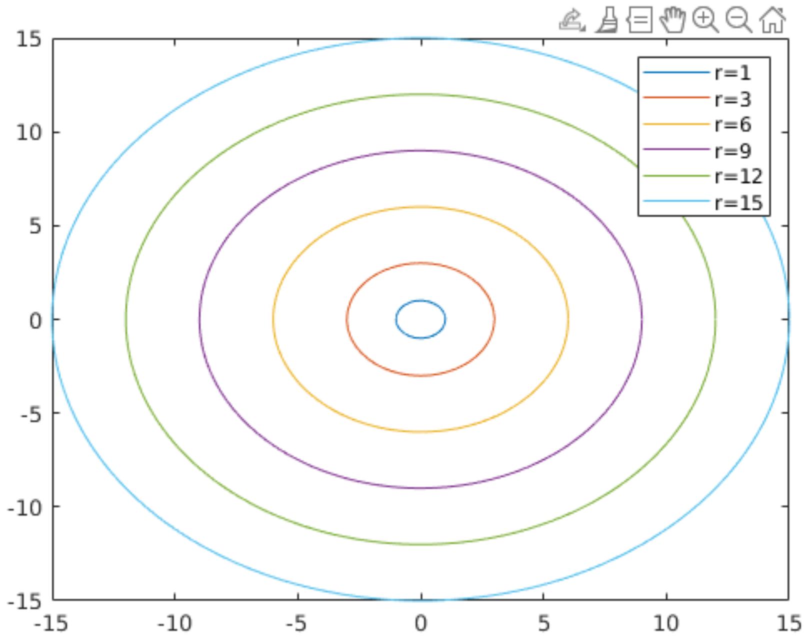
Assignment 2 - Dimitar Dimitrov - s1018291

2.3 hypotenuses

```
a = [1:5];  % initialize array of first leg
b = [1:5];  % initialize array of second leg
for i = 1:5
    a(i) = input(['enter number a', int2str(i),' :']);  % acquire values for first leg
    b(i) = input(['enter number b', int2str(i),' :']);  % acquire values for second leg
end

hyp = zeros(5,5);   % initialize matrix of hypotenuses

% for each combination of 2 legs calculate the hypotenuse
for i = 1:5
    for j = 1:5
        hyp(i,j) = sqrt(a(i)^2 + b(j)^2);
    end
end

disp(hyp);
```

2.3 radii

```
r=[1 3:3:15];
rho=[0:0.01:2*pi];
for i = 1:length(r)
    x = r(i)*cos(rho);
    y = r(i)*sin(rho);
    curr_legend = strcat("r=",int2str(r(i)));
    plot(x,y, 'DisplayName', curr_legend );
    hold on;
end
legend;
hold off;
```



2.4 Guess the number game

```
Pickme = round(10 + 10*rand(1)); % old picker changed to number between 10 and 20
Picker = round(100*rand(1));    % randomly pick number between 0 and 100
```

```
NrGuesses = 0;                  % initialize guess counter
Guessedcorrectly = 0;           % initialize correct guess boolean
nrplayers = 5;                  % initialize number of players
while (Guessedcorrectly == 0 && NrGuesses <10)  % repeat until either a correct guess or number of rounds == 10
    guesses = zeros(nrplayers); % initialize guess array
    % acquire every player's guess
    for i = 1:nrplayers
        guesses(i) = input(['Player ',int2str(i),' take your guess: ']);
    end
    % identify correct guesses
    correct = find(guesses == Picker);
    % if nobody guessed correctly
    if isempty(correct)
        % increment the round number
        NrGuesses = NrGuesses +1;
        % if 10 rounds are reached terminate game
        if NrGuesses == 10
            disp('GAME OVER, everybody guessed wrong 10 times!');
        else % else announce everyone's failure
            disp([int2str(NrGuesses), ' times everybody guessed Wrong']);
        end
    else
        % if somebody guessed correctly, terminate game
        Guessedcorrectly = 1;
        % announce winners
        for i = 1:length(correct)
            disp(['Player ', int2str(correct(i)),' guessed the number!']);
        end
        % show the number
        disp(['the number was ', int2str(Picker)]);
    end

    % if the game has been terminated ask if they want a new game
    if Guessedcorrectly == 1 || NrGuesses == 10
        NewGame = input('Do you want to play again? y/n ', 's');
        % if they do, reset all variables
        if NewGame == 'y'
            NrGuesses = 0;
            Guessedcorrectly = 0;
            Picker = round(100*rand(1));
        else
            disp('goodbye!')
        end
    end
end
```

2.6 celsius to fahrenheit

```
function [fahr] = cels2fahr(cels)
% function [fahr] = celsius2fahr(cels)
% this function converts temperature
% from celsius to fahrenheit
% returns the same type as input (number/vector/matrix)

fahr = cels * (9/5) + 32;
```

2.6 fahrenheit to celsius

```
function [cels] = fahr2cels(fahr)
% function [cels] = celsius2fahr(fahr)
% this function converts temperature
% from fahrenheit to celsius
% returns the same type as input (number/vector/matrix)

cels = (fahr - 32) * (5/9);
```

2.6 prices Vat calculator

```
function [total, priceVAT] = priceInclVAT(price, vat)
% function [priceVAT] = priceInclVAT(price, vat)
% this function calculates the price
% with vat given the price without vat
% and the vat in percent

total = price' + price'.*(vat./100);
priceVAT = price'.*(vat./100);
```

2.6 hit the ground

```
function [time, velocity, h_half] = hitGround(height, g)
% function [time] = hitGround(height)
% function that takes the height from which
% an object is dropped (in vacuum) and the
% acceleration of the gravity (in m/s^2)
% and returns:
% 'time' - the time it takes for it to hit the ground
% 'velocity' - the velocity at time of collision
% 'h_half' - the distance it has covered when half of the
% time to collision has elapsed

time = sqrt(height./g);
velocity = time.*g;
h_half = 0.5*g*(time.*time/4);
```

2.6 remove outliers

```
function [Y] = removeOutliers(X, nr_stds)
% function [Y] = removeOutliers(X);
% removes outliers from an array X
% returns new array Y without outliers
% an outlier is defined as an element
% that sits 'nr_stds' standard
% deviations away from the data mean

x_mean = mean(X);
x_std = std(X);
Y = X(abs(X-x_mean)/x_std < nr_stds);
```

2.9 function stats

```
function [means,maximums,minimums,standard_deviations] = functionStats(x,y)
% function [means,maximums,minimums,standard_deviations] = functionStats(x,y)
% a function that takes two vectors x and y of same size
% or a vector x and a matrix y, which has rows equal to size of vector x and
% multiple columns
% plots vector y (or columns of matrix y) as a function of vector x
% returns the means, maximums, minimums and standard_deviations of vector x
% and vector y (or columns of matrix y)
if size(x) == size(y)
    plot(x,y, '-or');
else
    plot(x,y, '-o');
end
means = [mean(x) mean(y)];
maximums = [max(x) max(y)];
minimums = [min(x) min(y)];
standard_deviations = [std(x) std(y)];
```