Yijia Chen Balliol Problem Sheet 4

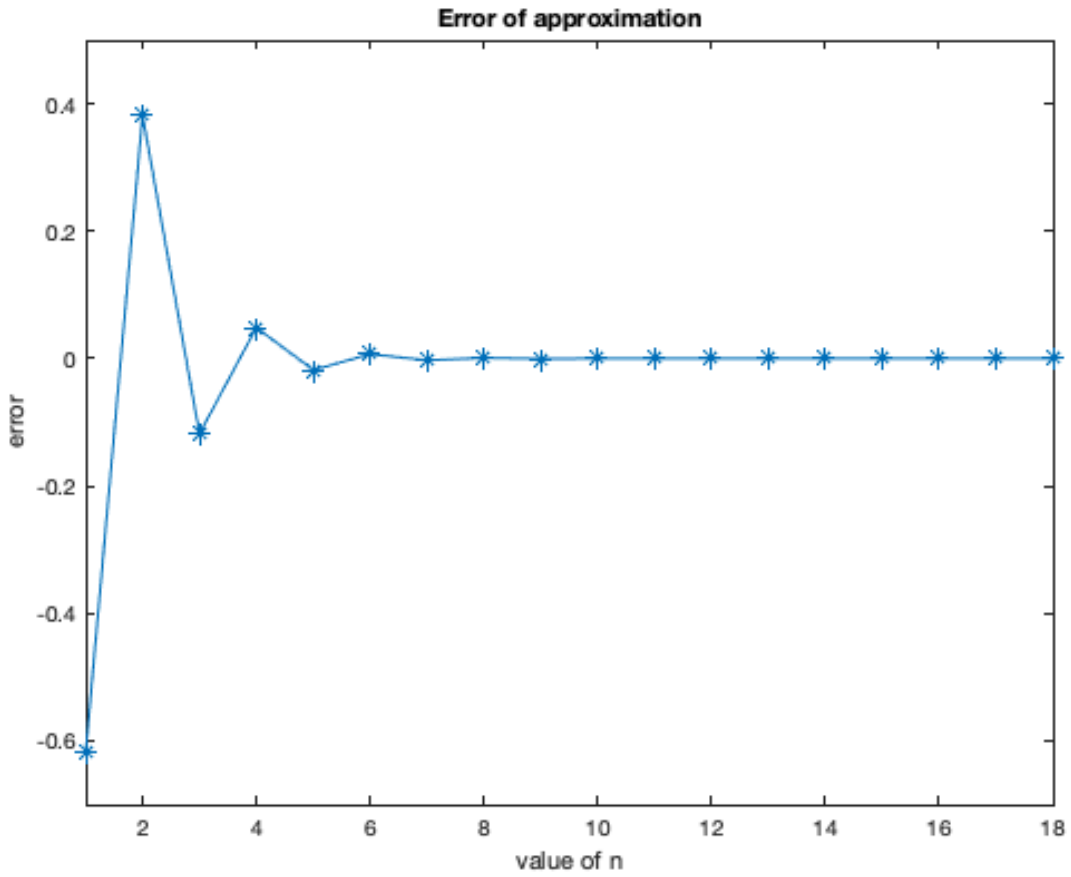
Q3

```
n = 0;
tol = 10^(-7);
phi = (1+sqrt(5))/2;
ratio = n_approximation(n, n_fibonacci(n+2));
% because F(n) is the (n+1)th Fibonacci number, F(n+1) is the (n+2)th
differ = abs(ratio-phi);
y = [];
y(1) = differ;
z(1) = ratio-phi;
while (differ > tol)
    n = n+1;
    ratio = n_approximation(n, n_fibonacci(n+2));
    differ = abs(ratio-phi);
    y(n+1)=differ;
    z(n+1)=ratio-phi;
end
ratio

% Q4
figure(1), clf
x = linspace(1,n+1,n+1);
plot(x,z,'Marker','*')
xlim([1 n+1])
ylim([-0.7 0.5])
title('Error of approximation')
xlabel('value of n')
ylabel('error')
```

ratio =

4181/2584



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```
function lis = n_fibonacci(n)

lis = [];

if n == 1
    lis(1)=1;
elseif n == 2
        lis(1)=1;
        lis(2)=1;
else
    for i = 3:n
        lis(1)=1;
        lis(2)=1;
        lis(i) = lis(i-2)+lis(i-1);
    end
end

lis;
```

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```
function ratio = n_approximation(n,list)

ratio = sym(list(n+2)/list(n+1));
```

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