Code for problem set 2

Shang Gao

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1. Loading packages and setting parameter values

```
using Plots

A=1;
α=0.3;
σ=2;
ρ=0.05;
δ=0.05;
T=60;
n=2;

β=1/(1+ρ)

0.9523809523809523
```

Steady states

```
function k_st(α,β,δ,A)
(((1/β)-1+δ)/(A*α))^(1/(α-1))
end;

function c_st(A,k,δ)
A*(k^(α))-δ*k
end;
```

Finding the saddle path

```
function spath(k_0,A,δ,tolerance)
    R=zeros(T,n);

    R[1,1]=k_0

    for j=0:1e-6:c_star
    R[1,2] = j
    for i = 1:T-1
        R[i+1,1]=A*(R[i,1])^(α)+(1-δ)*R[i,1]-R[i,2]
        R[i+1,2]=R[i,2]*(β*(α*A*(R[i+1,1]^(α-1))+1-δ))^(1/σ)
    end
    if abs(R[60,1]-k_star)<tolerance
        break
    end
    end
    return(R)
end;
```

2. Computing the steady state values

```
k_star=k_st(α,β,δ,A);
c_star=c_st(A,k_star,δ);

println("Steady state value of capital is $k_star")
println("Steady state value of consumption is $c_star")

Steady state value of capital is 4.803986656673088
Steady state value of consumption is 1.3611295527240423
```

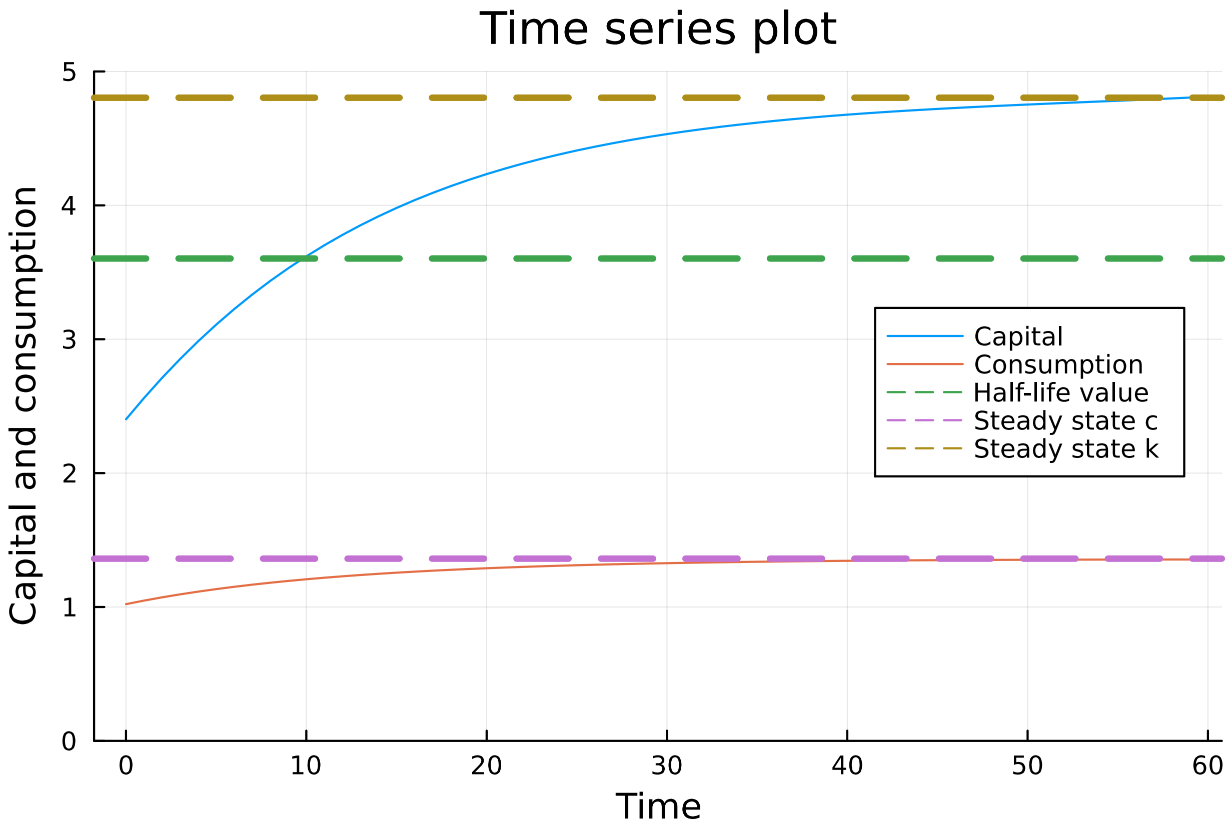
3. Run iteration with for loop

```
Q=spath(0.5*k_star,A,δ,1e-2);
c_0=Q[1,2];
println("The initial value for conusmption that will converge towards the steady state
is $c_0")

The initial value for conusmption that will converge towards the steady sta
te is 1.021359
```

4. Plots the graphs

For time series plot:

```
t=0:59
k=Q[1:60,1]
c=Q[1:60,2]
half_life = ((0.5+1)/2)*k_star

plot(t,Q,legend=:right,ylims=(0,5),label=["Capital" "Consumption"])
hline!([half_life],label="Half-life value",line=(:dash,3))
hline!([c_star],label="Steady state c",line=(:dash,3))
hline!([k_star],label="Steady state k",line=(:dash,3))
plot!(title="Time series plot",legendfontsize=8,xaxis="Time",yaxis="Capital and
consumption")
```



To find the half-life, I use the *findall* command

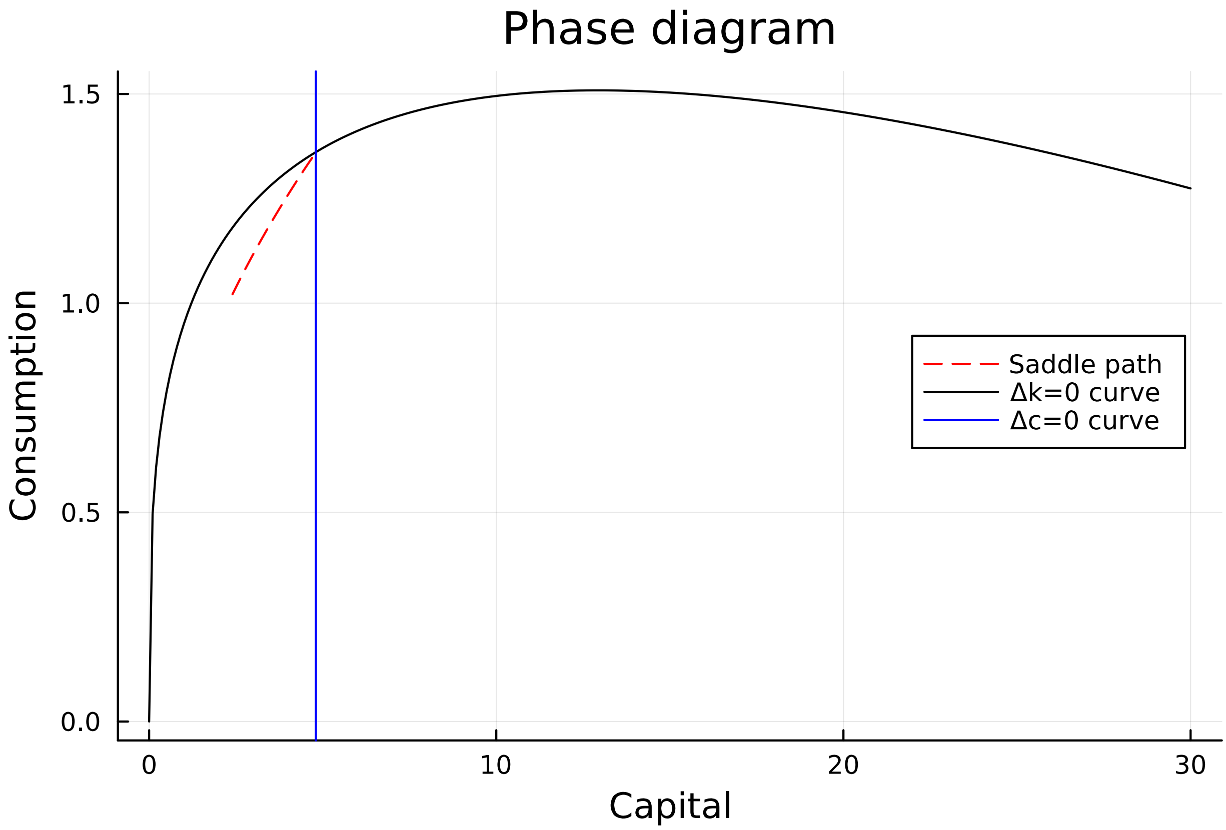
```
hl_t=findall(x->x>=half_life,k)[1];
println("The time taken to reach the half-life value is $hl_t")
```

```
The time taken to reach the half-life value is 11
```

As shown, at $t = 11$, capital hits its half-life value.

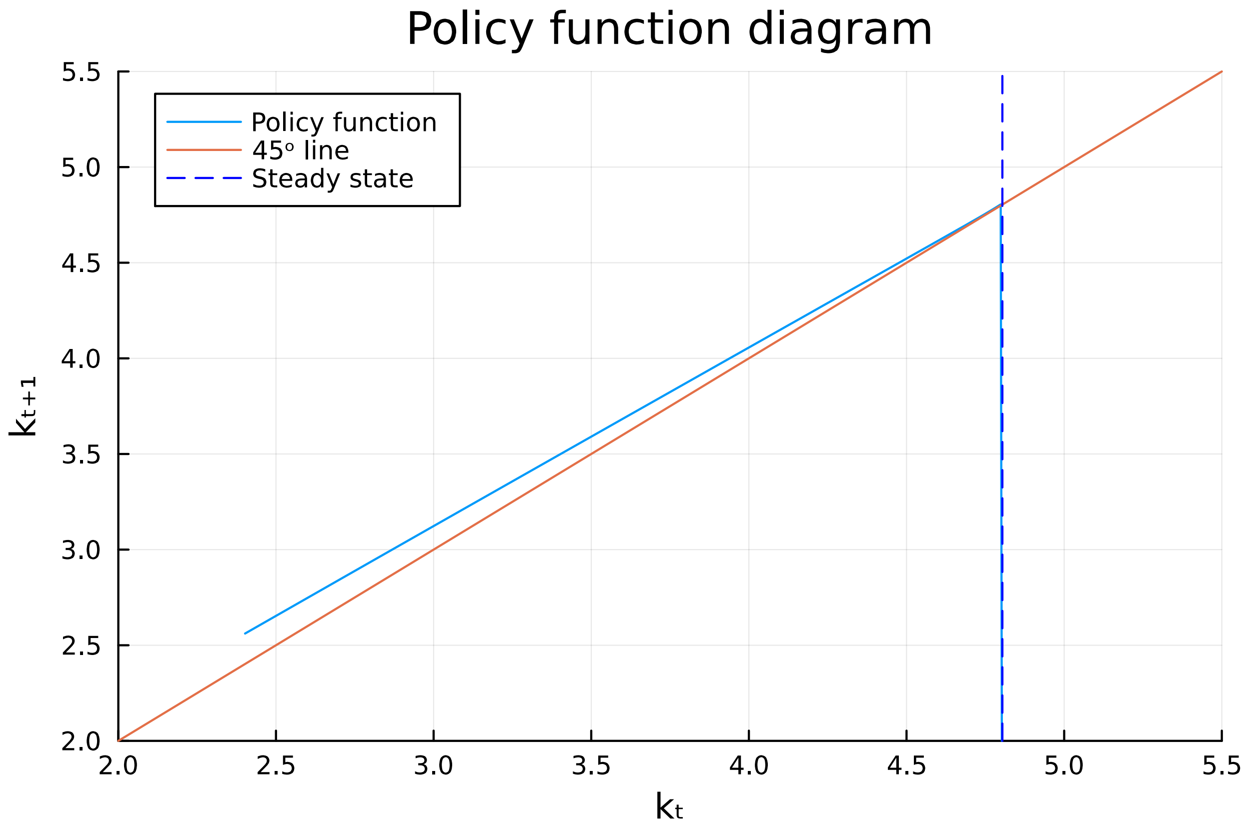
For phase diagram:

```
k_bar=0:0.1:30
c_bar=A*(k_bar).^(α)-δ*k_bar

plot(k,c,label="Saddle path",color="red",legend=:right,line=(:dash,1))
plot!(k_bar,c_bar,label="Δk=0 curve",color="black")
vline!([k_star],label="Δc=0 curve",color="blue")
plot!(xaxis="Capital",yaxis="Consumption",title="Phase diagram")
```



For the policy function plot

```
k_fwd = zeros(60,1)
k_fwd[1] = k[2]
for i in 2:59
    k_fwd[i] = k[i+1]
end
plot(k,k_fwd,xaxis="k_t",yaxis="k_t_+_1",label = "Policy
function",legend=:topleft,xlims=(2,5.5),ylims=(2,5.5))
plot!(2:0.1:6,2:0.1:6,label = "45 line")
vline!([k_star],label = "Steady state",title="Policy function
diagram",line=(:dash,1),color="blue")
```



The dashed line marks the steady state value, which is also the intercept of the policy function and the 45^o line.