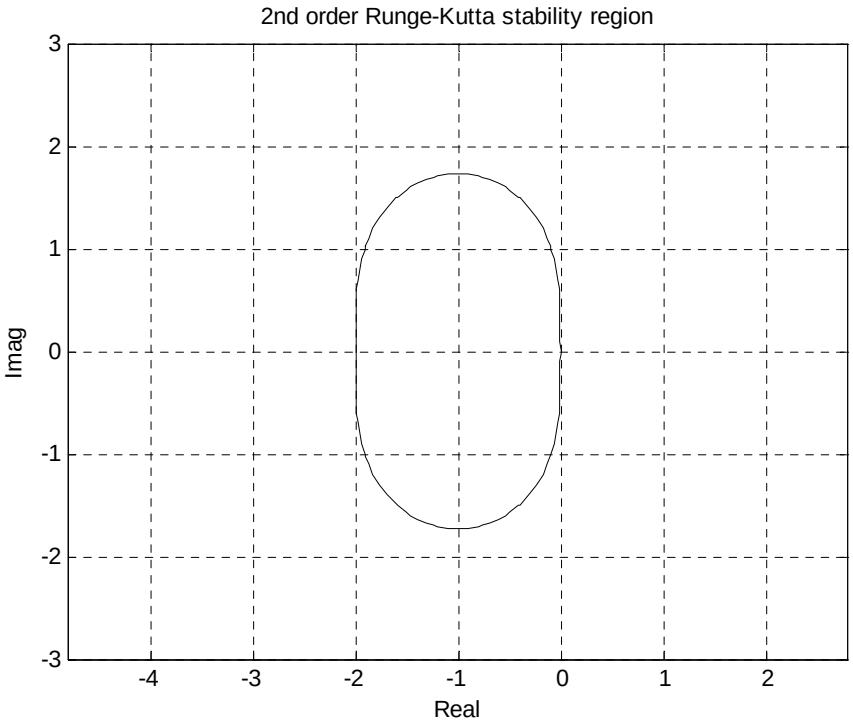
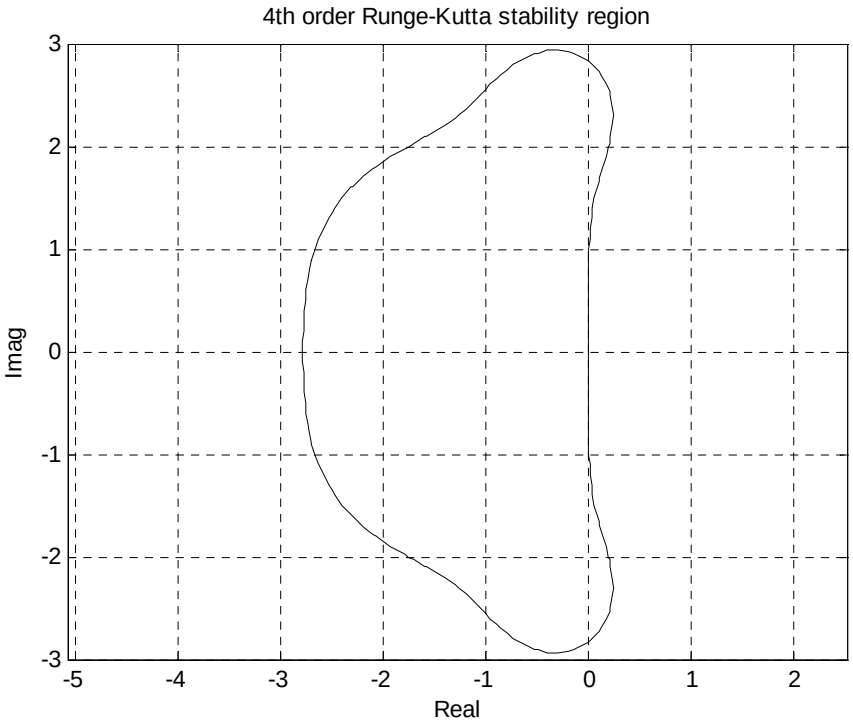
MATLAB1 (“HW1_1.m”)





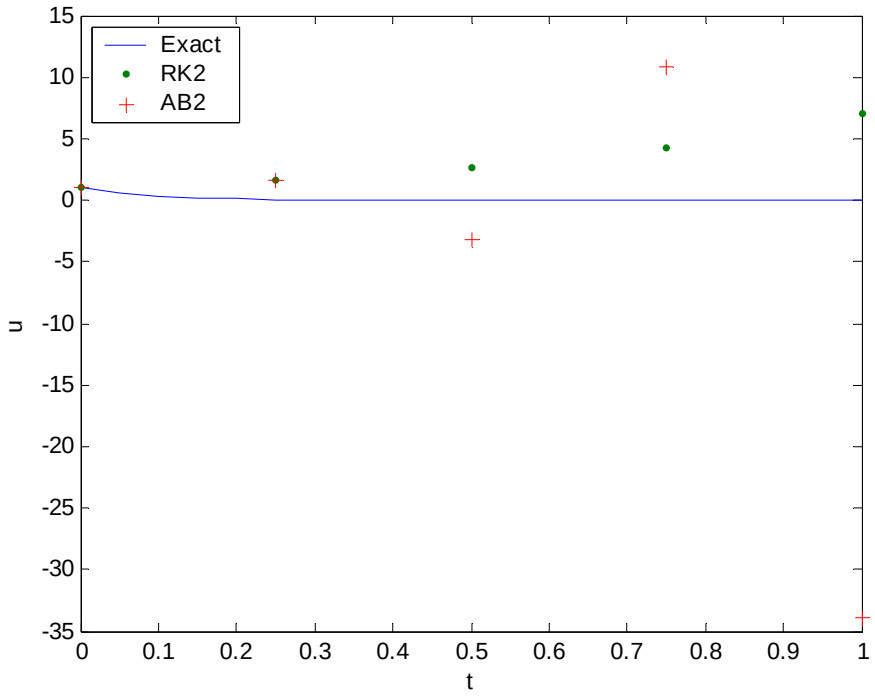
MATLAB2 (“f_is.m”, “RK_2.m”, “AB_2.m”, “HW1_2.m”)

u’=-10u → a=10

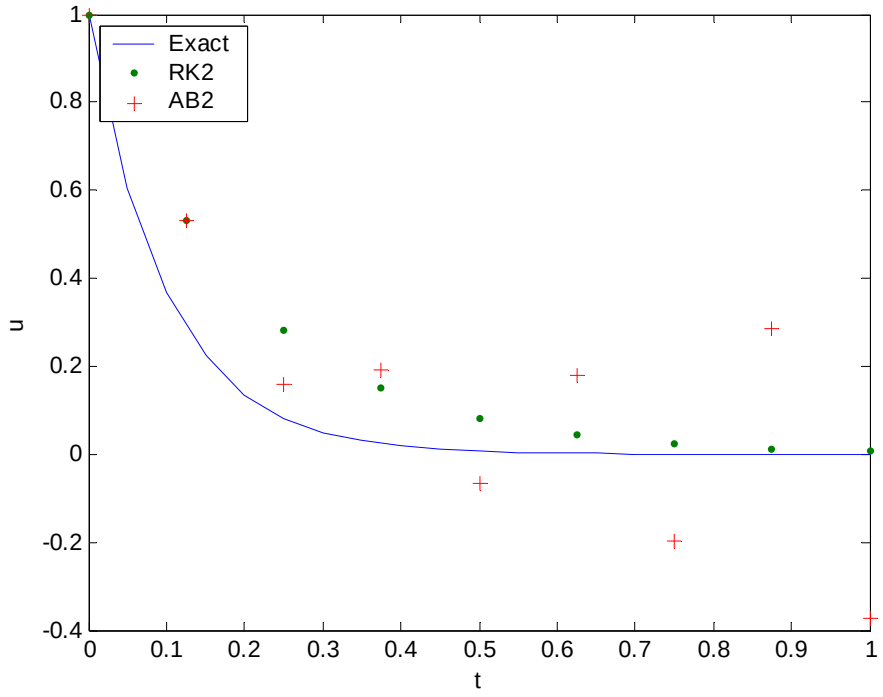
The stability limits of 2nd order Runge-Kutta Method: a*h_rk2=2 → h_rk2=2/10=0.2
The stability limits of Adams-Bashforth Method: a*h_ab2=1 → h_ab2=1/10=0.1

1) Matlab (set initial h=1/4=0.25 in “HW1_2.m”)

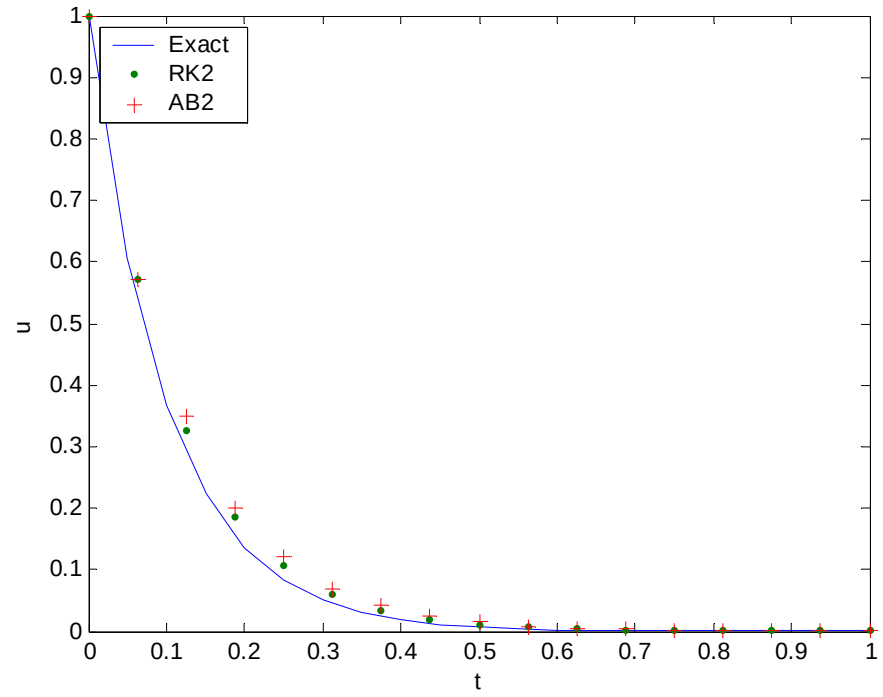
h=1/4=0.25



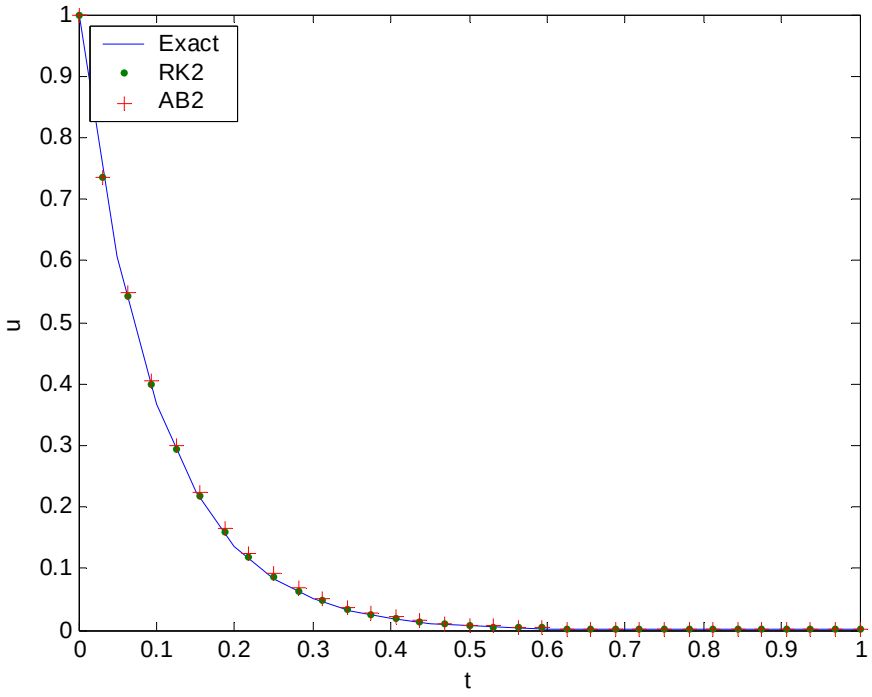
h=1/8=0.125



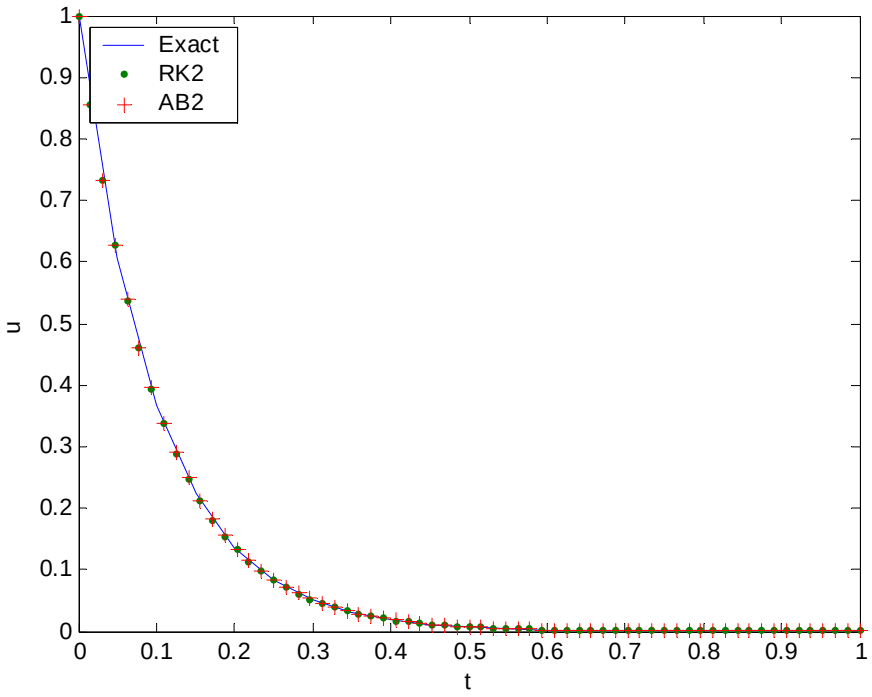
h=1/16=0.0625



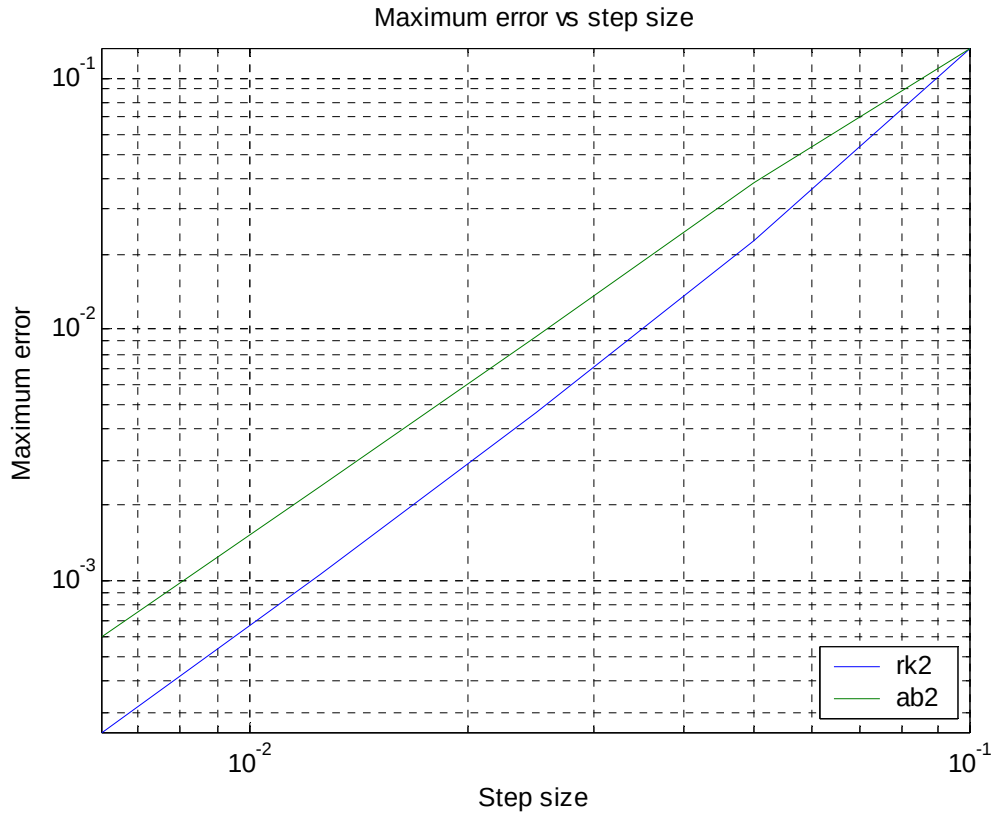
h=1/32=0.03125



h=1/64=0.015625



2) Accuracy test (set initial h=0.1 in “HW1_2.m”)



$$\max\_error = C(step\_size)^B \equiv 10^A (step\_size)^B$$
$$\rightarrow \log_{10}(\max\_error) = A + B\log_{10}(step\_size)$$

<u>2nd order Runge-Kutta</u>

>> prk2=polyfit(log10(h_t),log10(rk2_u),1)

>> prk2 =

2.2511 1.3199

→ A=1.3199, B=2.2511 → p=round(B)=2 ;accuracy

<u>Adams-Bashforth</u>

>> pab2=polyfit(log10(h_t),log10(ab2_u),1)

>> pab2 =

1.9584 1.1038

→ A=1.1038, B=2.25 → p=round(B)=2 ;accuarcy