

# Problem Set 2 Solution

Instructor : Yujung Hwang \*

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## Question 1. discretizing the AR(1) income process

```
> print(Ygrid)
      [,1] [,2] [,3] [,4] [,5]
[1,] 0.594 0.818    1 1.22 1.68
[2,] 0.594 0.818    1 1.22 1.68
[3,] 0.594 0.818    1 1.22 1.68
[4,] 0.594 0.818    1 1.22 1.68
[5,] 0.594 0.818    1 1.22 1.68
[6,] 0.594 0.818    1 1.22 1.68
[7,] 0.594 0.818    1 1.22 1.68
[8,] 0.594 0.818    1 1.22 1.68
[9,] 0.594 0.818    1 1.22 1.68
[10,] 0.594 0.818    1 1.22 1.68
[11,] 0.594 0.818    1 1.22 1.68
[12,] 0.594 0.818    1 1.22 1.68
[13,] 0.594 0.818    1 1.22 1.68
[14,] 0.594 0.818    1 1.22 1.68
[15,] 0.594 0.818    1 1.22 1.68
[16,] 0.594 0.818    1 1.22 1.68
[17,] 0.594 0.818    1 1.22 1.68
[18,] 0.594 0.818    1 1.22 1.68
[19,] 0.594 0.818    1 1.22 1.68
[20,] 0.594 0.818    1 1.22 1.68
[21,] 0.594 0.818    1 1.22 1.68
[22,] 0.594 0.818    1 1.22 1.68
[23,] 0.594 0.818    1 1.22 1.68
[24,] 0.594 0.818    1 1.22 1.68
[25,] 0.594 0.818    1 1.22 1.68
[26,] 0.594 0.818    1 1.22 1.68
[27,] 0.594 0.818    1 1.22 1.68
[28,] 0.594 0.818    1 1.22 1.68
[29,] 0.594 0.818    1 1.22 1.68
```

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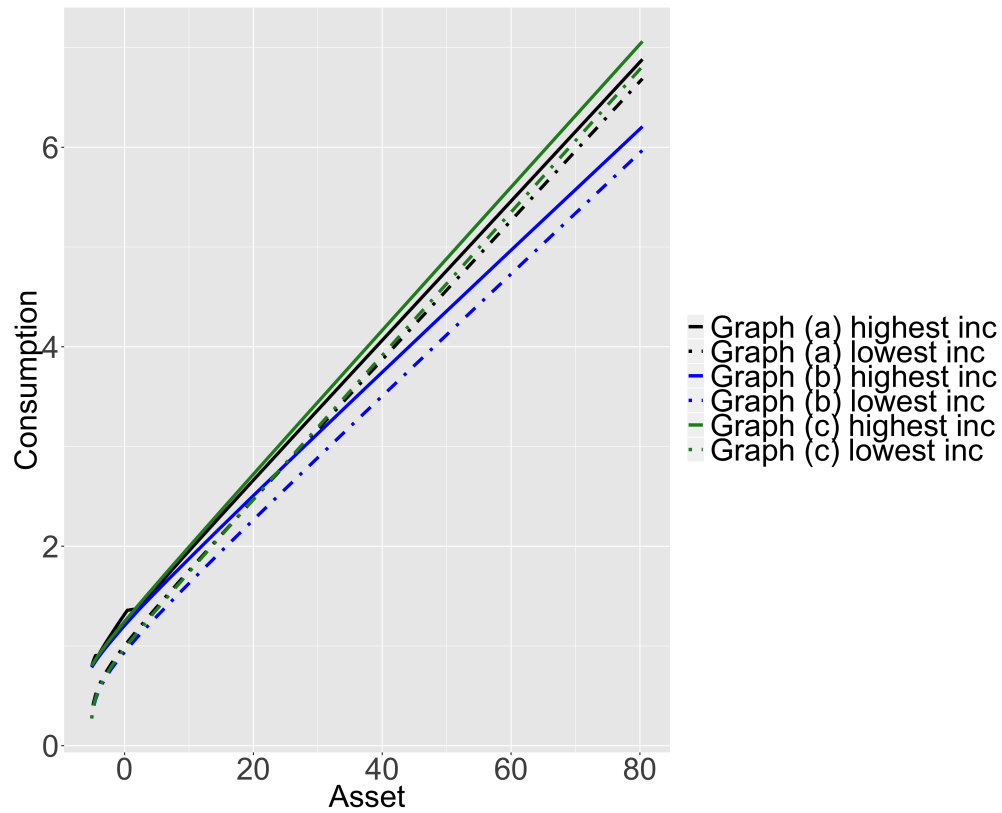
\*yujungghwang@gmail.com

```

[30,] 0.594 0.818    1 1.22 1.68
[31,] 0.594 0.818    1 1.22 1.68
[32,] 0.594 0.818    1 1.22 1.68
[33,] 0.594 0.818    1 1.22 1.68
[34,] 0.594 0.818    1 1.22 1.68
[35,] 0.594 0.818    1 1.22 1.68
[36,] 0.594 0.818    1 1.22 1.68
[37,] 0.594 0.818    1 1.22 1.68
[38,] 0.594 0.818    1 1.22 1.68
[39,] 0.594 0.818    1 1.22 1.68
[40,] 0.594 0.818    1 1.22 1.68
> print('Income_Transition_Matrix')
[1] "Income_Transition_Matrix"
> print(incTransitionMrx)
      [,1] [,2] [,3] [,4] [,5]
[1,] 0.6134 0.2672 0.0934 0.0236 0.0023
[2,] 0.2516 0.3355 0.2509 0.1317 0.0304
[3,] 0.1016 0.2492 0.2983 0.2492 0.1016
[4,] 0.0304 0.1317 0.2509 0.3355 0.2516
[5,] 0.0023 0.0236 0.0934 0.2672 0.6134
>

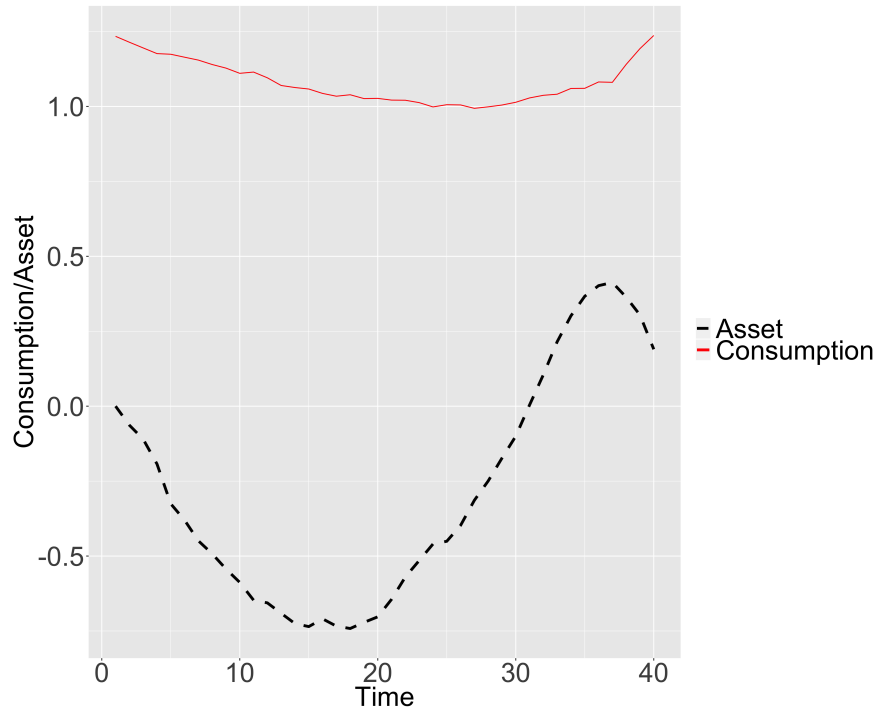
```

## Question 2. cake-eating problem with uncertain income



We don't know analytical solution when income is uncertain, so we can't comment on the degree of numerical errors. However, the graph shows that different solution methods give slightly different policy functions, which can be attributed to differences in numerical errors. The solution method (a) and (c) give similar answers. The dotted line (corresponding to the lowest income) is always below the solid line (corresponding to the highest income), because the marginal propensity to consume is greater than zero.

### Question 3. computing simulated moments on consumption and asset



Note that  $\beta(1+r) = 0.978 \leq 1$ . Therefore, it is better for the agent to borrow heavily when young. As the agent gets older, the agent accumulates more assets to avoid default before death. In the last lifetime period, the agent consumes everything on hand.