

LaTeX-Moodle Quiz

1. Old-skool MCQ

Time is finite and indexed by $t \in \{0, 1, \dots, T\}$. Let the optimal value of a policy maker beginning with resources k_0 be given by: $V_0(k_0) = \max_{\{c_t, k_{t+1}\}_{t=0}^T} \sum_{t=0}^T \beta^t (c_t)^\alpha$ subject to the constraints: $k_{t+1} = \min\{k_t, 1\} - c_t$, $0 \leq c_t \leq \min\{k_t, 1\}$, and, $k_{T+1} \geq 0$, where $\alpha \in (0, 1)$; and $k = K/L$ and c , respectively, refer to per-worker capital stock and consumption. The state space $X \ni k_t$ is bounded.

Describe precisely what we mean by a strategy in this setting.

- (a) A strategy is a date and state contingent plan $\{g_t(k_t)\}_{t=0}^T$ such that $c_t = g_t(k_t)$ at each date t and state k_t . ✓
- (b) A strategy is an optimal date and state contingent plan $\{g_t(k_t)\}_{t=0}^T$ such that $c_t = g_t(k_t)$ at each date t and state k_t .
- (c) A strategy is the optimal date and state contingent plan $\{g_t(k_t)\}_{t=0}^T$ such that $c_t = g_t(k_t)$ at each date t and state k_t .
- (d) A strategy is a policy selection $c_t = g_t(k_t)$ at each date t and state k_t .

2. Numerical

The approximate the value of $\sqrt{2}$ is

- 1.4142 ± 0.01 ✓
- 0.70711 ± 0.01 (20%)
- $* \pm 0.01$ (0%)
- 2.5 ± 0.01 (0%)

3. A Cloze type question

Thanks to calculus, invented by Isaac Newton ✓, we know that the (Case-Sensitive)
first derivative of x^2 is

- This one $2x$ ✓
 - This one $3x$
 - This one 0
- and that $\int_0^2 x^2 dx$ equals 2.667 ± 0.001 ✓. Thanks, Isaac!

4. Another Cloze type with in-line MCQ

“Hello, Goodbye” was a song by: The Beatles ✓. (Case-Sensitive)
They were sometimes high on

- marijuana
- LSD ✓
- speed
- Molly

It was recorded in EMI Studios ✓ in the city of (Case-Sensitive)

- Birmingham
- London ✓
- Liverpool
- Edinburgh

5. **Short answer**

Newton's rival was Gottfried Wilhelm _____

- Leibniz (90%)
- Leibniz. ✓
- leibniz (70%)
- leibniz. (80%)

6. **Essay, Examiner notes**

Let $\beta \in (0, 1)$ and $\phi := \phi_t$.

Prove that this monetary equilibrium $\phi = \beta\phi_{+1}$ is unique.

Show here:

Notes: (not included in XML)

- Examiner note 1
- Examiner note 2
- Examiner note 3

7. **Arithmetic Quiz (3, 2)**

Solve the following tasks!

$$3 + 2 = \boxed{5 \quad \checkmark}$$

$$3 - 2 = \boxed{1 \quad \checkmark}$$

$$3 \cdot 2 = \boxed{6 \quad \checkmark}$$

8. **Arithmetic Quiz (4, 2)**

Solve the following tasks!

$$4 + 2 = \boxed{6 \quad \checkmark}$$

$$4 - 2 = \boxed{2 \quad \checkmark}$$

$$4 \cdot 2 = \boxed{8 \quad \checkmark}$$

$$4 : 2 = \boxed{2 \quad \checkmark}$$

9. **Arithmetic Quiz (4, 3)**

Solve the following tasks!

$$4 + 3 = \boxed{7 \quad \checkmark}$$

$$4 - 3 = \boxed{1 \quad \checkmark}$$

$$4 \cdot 3 = \boxed{12 \quad \checkmark}$$

10. **Arithmetic Quiz (5, 2)**

Solve the following tasks!

$$5 + 2 = \boxed{7 \quad \checkmark}$$

$$5 - 2 = \boxed{3 \quad \checkmark}$$

$$5 \cdot 2 = \boxed{10 \quad \checkmark}$$

11. Arithmetic Quiz (5, 3)

Solve the following tasks!

$$5 + 3 = \boxed{8 \quad \checkmark}$$

$$5 - 3 = \boxed{2 \quad \checkmark}$$

$$5 \cdot 3 = \boxed{15 \quad \checkmark}$$

12. Arithmetic Quiz (5, 4)

Solve the following tasks!

$$5 + 4 = \boxed{9 \quad \checkmark}$$

$$5 - 4 = \boxed{1 \quad \checkmark}$$

$$5 \cdot 4 = \boxed{20 \quad \checkmark}$$

13. Arithmetic Quiz (6, 2)

Solve the following tasks!

$$6 + 2 = \boxed{8 \quad \checkmark}$$

$$6 - 2 = \boxed{4 \quad \checkmark}$$

$$6 \cdot 2 = \boxed{12 \quad \checkmark}$$

$$6 : 2 = \boxed{3 \quad \checkmark}$$

14. Arithmetic Quiz (6, 3)

Solve the following tasks!

$$6 + 3 = \boxed{9 \quad \checkmark}$$

$$6 - 3 = \boxed{3 \quad \checkmark}$$

$$6 \cdot 3 = \boxed{18 \quad \checkmark}$$

$$6 : 3 = \boxed{2 \quad \checkmark}$$

15. Arithmetic Quiz (6, 4)

Solve the following tasks!

$$6 + 4 = \boxed{10 \quad \checkmark}$$

$$6 - 4 = \boxed{2 \quad \checkmark}$$

$$6 \cdot 4 = \boxed{24 \quad \checkmark}$$

16. **Arithmetic Quiz (6, 5)**

Solve the following tasks!

$$6 + 5 = \boxed{11 \quad \checkmark}$$

$$6 - 5 = \boxed{1 \quad \checkmark}$$

$$6 \cdot 5 = \boxed{30 \quad \checkmark}$$

17. **Arithmetic Quiz (7, 2)**

Solve the following tasks!

$$7 + 2 = \boxed{9 \quad \checkmark}$$

$$7 - 2 = \boxed{5 \quad \checkmark}$$

$$7 \cdot 2 = \boxed{14 \quad \checkmark}$$

18. **Arithmetic Quiz (7, 3)**

Solve the following tasks!

$$7 + 3 = \boxed{10 \quad \checkmark}$$

$$7 - 3 = \boxed{4 \quad \checkmark}$$

$$7 \cdot 3 = \boxed{21 \quad \checkmark}$$

19. **Arithmetic Quiz (7, 4)**

Solve the following tasks!

$$7 + 4 = \boxed{11 \quad \checkmark}$$

$$7 - 4 = \boxed{3 \quad \checkmark}$$

$$7 \cdot 4 = \boxed{28 \quad \checkmark}$$

20. **Arithmetic Quiz (7, 5)**

Solve the following tasks!

$$7 + 5 = \boxed{12 \quad \checkmark}$$

$$7 - 5 = \boxed{2 \quad \checkmark}$$

$$7 \cdot 5 = \boxed{35 \quad \checkmark}$$

21. **Arithmetic Quiz (7, 6)**

Solve the following tasks!

$$7 + 6 = \boxed{13 \quad \checkmark}$$

$$7 - 6 = \boxed{1 \quad \checkmark}$$

$$7 \cdot 6 = \boxed{42 \quad \checkmark}$$

22. Arithmetic Quiz (8, 2)

Solve the following tasks!

$$8 + 2 = \boxed{10 \quad \checkmark}$$

$$8 - 2 = \boxed{6 \quad \checkmark}$$

$$8 \cdot 2 = \boxed{16 \quad \checkmark}$$

$$8 : 2 = \boxed{4 \quad \checkmark}$$

23. Arithmetic Quiz (8, 3)

Solve the following tasks!

$$8 + 3 = \boxed{11 \quad \checkmark}$$

$$8 - 3 = \boxed{5 \quad \checkmark}$$

$$8 \cdot 3 = \boxed{24 \quad \checkmark}$$

24. Arithmetic Quiz (8, 4)

Solve the following tasks!

$$8 + 4 = \boxed{12 \quad \checkmark}$$

$$8 - 4 = \boxed{4 \quad \checkmark}$$

$$8 \cdot 4 = \boxed{32 \quad \checkmark}$$

$$8 : 4 = \boxed{2 \quad \checkmark}$$

25. Arithmetic Quiz (8, 5)

Solve the following tasks!

$$8 + 5 = \boxed{13 \quad \checkmark}$$

$$8 - 5 = \boxed{3 \quad \checkmark}$$

$$8 \cdot 5 = \boxed{40 \quad \checkmark}$$

26. Arithmetic Quiz (8, 6)

Solve the following tasks!

$$8 + 6 = \boxed{14 \quad \checkmark}$$

$$8 - 6 = \boxed{2 \quad \checkmark}$$

$$8 \cdot 6 = \boxed{48 \quad \checkmark}$$

27. Arithmetic Quiz (8, 7)

Solve the following tasks!

$$8 + 7 = \boxed{15 \quad \checkmark}$$

$$8 - 7 = \boxed{1 \quad \checkmark}$$

$$8 \cdot 7 = \boxed{56 \quad \checkmark}$$

28. Arithmetic Quiz (9, 2)

Solve the following tasks!

$$9 + 2 = \boxed{11 \quad \checkmark}$$

$$9 - 2 = \boxed{7 \quad \checkmark}$$

$$9 \cdot 2 = \boxed{18 \quad \checkmark}$$

29. Arithmetic Quiz (9, 3)

Solve the following tasks!

$$9 + 3 = \boxed{12 \quad \checkmark}$$

$$9 - 3 = \boxed{6 \quad \checkmark}$$

$$9 \cdot 3 = \boxed{27 \quad \checkmark}$$

$$9 : 3 = \boxed{3 \quad \checkmark}$$

30. Arithmetic Quiz (9, 4)

Solve the following tasks!

$$9 + 4 = \boxed{13 \quad \checkmark}$$

$$9 - 4 = \boxed{5 \quad \checkmark}$$

$$9 \cdot 4 = \boxed{36 \quad \checkmark}$$

31. Arithmetic Quiz (9, 5)

Solve the following tasks!

$$9 + 5 = \boxed{14 \quad \checkmark}$$

$$9 - 5 = \boxed{4 \quad \checkmark}$$

$$9 \cdot 5 = \boxed{45 \quad \checkmark}$$

32. Arithmetic Quiz (9, 6)

Solve the following tasks!

$$9 + 6 = \boxed{15 \quad \checkmark}$$

$$9 - 6 = \boxed{3 \quad \checkmark}$$

$$9 \cdot 6 = \boxed{54 \quad \checkmark}$$

33. Arithmetic Quiz (9, 7)

Solve the following tasks!

$$9 + 7 = \boxed{16 \quad \checkmark}$$

$$9 - 7 = \boxed{2 \quad \checkmark}$$

$$9 \cdot 7 = \boxed{63 \quad \checkmark}$$

34. Arithmetic Quiz (9, 8)

Solve the following tasks!

$$9 + 8 = \boxed{17 \quad \checkmark}$$

$$9 - 8 = \boxed{1 \quad \checkmark}$$

$$9 \cdot 8 = \boxed{72 \quad \checkmark}$$

35. Incomplete markets, HA, Aiyagari

Practical (Basic, [10])

Consider a mashup of the model of Mark Huggett and Ayse Imhoroglu from our lab session. We use the same notation as in the lectures notes. These are available to you to consult.

Suppose now there is a government that wishes to finance unemployment benefit transfer b to the unemployed agents. Assume that aggregate labor and capital incomes, respectively $w_t N_t$ and $r_t K_t$, are taxed at a flat rate τ to finance the total transfer to all the unemployed. So the government budget constraint would be

$$(1 - N)b = \tau (r_t K_t + w_t N_t),$$

where N is the equilibrium ergodic measure of employed agents.

On the agents' side, the agents' sequential budget constraint would now be

$$a_{t+1} + c_t = (1 - \tau)w(r)e_t + b(1 - e_t) + [1 + (1 - \tau)r] a_t,$$

where a is the agent's asset position, c is consumption and $e \in \{0, 1\}$ can take on an unemployment (0) and employment (1) state, according to a Markov chain.

Recall in this model, the market return r will equal the firm's (net) marginal product of capital.

The numbered steps below refer to sequentially ordered tasks to be assigned to the computer. Choose the correct task and match to its correct step number.

- | | |
|-------------|--|
| (a) Step 1: | Guess a market return and tax rate. |
| (b) Step 2: | Solve agents' dynamic program. |
| (c) Step 3: | Compute distribution of asset claims on capital. |
| (d) Step 4: | Get implied aggregate capital and labor supply. |

- (e) Step 5: Check market clearing and government budget balance.
- (f) Step 6: Update market return and tax rate.
- (g) Compute ergodic unemployment rate.
- (h) Update government spending level.
- (i) Set tax rate to zero.
- (j) Iterate until tax rate maximizes government budget.
- (k) Give a dog a bone.
- (l) Remember to pick up milk.
- (m) Calculate optimal tax and transfer.