Problem Set 2

Due on 7 March 2024, **before class**.

Problem 1

Consider an unemployed worker searching for a job. The worker is risk-neutral and has discount factor β. In every unemployment period the worker earns income b and draws a job offer with probability λ. A job offer has wage w which is drawn from cdf F with support $[0, B]$. When a job is accepted, the worker starts to work next period but is first employed on probation **which lasts exactly one period**. At the end of the probation period, the worker obtains a permanent position with probability ρ; otherwise the worker becomes unemployed again. Once the worker has obtained a permanent position, the job lasts forever.

1. What is the value of a job, both in the probation period and thereafter?

2. Show that an unemployed worker follows a reservation wage strategy. Find an implicit equation that determines the reservation wage.

3. How does the reservation wage depend on parameter ρ (the chance to get a permanent position)? Provide intuition.

Problem 2

Consider the following job search problem of a risk–neutral, infinitely–lived worker who discounts future income with factor $\beta = 0.75$. In period $t = 0$ the worker is unemployed. When the worker is unemployed in period t, he earns income 2 and is offered a job with probability $\lambda = 1$. A job offer has "high wage" $w_H = 3.3$ with probability $1/2$ and "low wage" $w_L = 2.7$ with probability $1/2$. When the worker accepts a job, he keeps it for the rest of his life.

1. Calculate the reservation wage. Does the worker accept low–wage jobs?

2. Now suppose that the worker obtains a job offer only with probability $\lambda = 0.5$. Conditional on getting an offer, wage offers are as before. Find again the reservation wage. Does the worker accept low–wage jobs?

3. Calculate the probability that an unemployed worker finds (and accepts) a job, separately in case (1) and in case (2). Explain the difference.

Numerical Tips

- Suppose you have two column vectors x and y with n elements each. To compute $S = \sum_{i=1}^{n} x_i y_i$ you can use the sum function in Matlab with element-wise multiplication:

```
1    S = sum(x.*y);
```

Alternatively you can type

```
1  S = x'*y; %dot product
```

where `'` is the transpose operator.

- To generate the wage grid and the probability vector for Problem 2, you can write

```
wL = 2.7;
wH = 3.3;
pr = 0.5;
w_grid = [wL,wH]';
w_prob = [pr,1-pr]';
```

- Bear in mind that there are several ways to solve problem 2; depending on your strategy you may or may not need these numerical tips.