

## Problem set 4

Due date: 12/4

Each question is worth 5 points. No credit without workings.

For what follows, you can assume that the FOC are sufficient.

Consider a consumer (Manuela) with utility function  $u(x, y) = 2 \ln x + \ln y$ . Let  $I$  denote her income and  $(p_x, p_y)$  denote the prices of the two commodities.

1. State Manuela's Marshallian consumer optimization problem.
2. Solve for Manuela's Marshallian demands  $m(p_x, p_y, I)$ .
3. State Manuela's Hicksian consumer optimization problem.
4. Solve for Manuela's Hicksian demands  $h(p_x, p_y, \bar{u})$ .
5. Find Manuela's indirect utility function  $v(p_x, p_y, I)$ .
6. Find Manuela's expenditure function  $e(p_x, p_y, \bar{u})$ .
7. Verify that  $v(p_x, p_y, e(p_x, p_y, \bar{u})) = \bar{u}$ .
8. Verify that  $h(p_x, p_y, v(p_x, p_y, I)) = m(p_x, p_y, I)$ .
9. Using  $m(p_x, p_y, I)$ , find  $\frac{\partial m_x}{\partial p_x}$ .
10. Using the Slutsky equation, verify that you get the same answer for  $\frac{\partial m_x}{\partial p_x}$ .
11. Confirm that Shepherd's lemma holds for both goods.
12. Do a sketch of the answer when  $p_x = p_y = I = 1$ . A really pretty one with colours and a well-drawn indifference curve.