

3. Suppose Alia consumes only melange (M) and water (W), and her utility function is $U_A(M,W)=M^2W$. The price of melange is P, and the price of water is 1. Alia's income is 100. In this problem, you will find Alia's utility maximizing combination of melange and water. (Note: some of your answers in this problem may be functions of P.)
- Write down Alia's budget constraint. (3 points)
 - Find Alia's marginal utility of melange. (2 points)
 - Find Alia's marginal utility of water. (2 points)
 - Find Alia's marginal rate of substitution. (2 points)
 - What is the slope of Alia's budget constraint? (2 points)
 - For Alia to be maximizing utility, what relationship must hold between her MRS and the slope of her budget constraint? Write down this relationship in the form of an equation, using your answers from parts (d) and (e). (3 points)
 - Using the equation from part (f) and the budget constraint from part (a), find Alia's utility maximizing bundle. (6 points)
 - Suppose $P=1$. What bundle will Alia consume? In the space below or the back of the page, graph Alia's budget constraint and utility-maximizing bundle. (2 points)
 - Suppose $P=2$. What bundle will Alia consume? On the same graph from part (h), draw Alia's new budget constraint and utility-maximizing bundle. (2 points)
 - Suppose $P=3$. What bundle will Alia consume? On the same graph from part (h), draw Alia's new budget constraint and utility-maximizing bundle. (2 points)
 - On the same graph from parts (h) and (i), sketch Alia's price offer curve. (4 points)