A monopolist faces two consumers, one with demand function $D_H(P) = 36 - b_H P$ and the other with demand function $D_L(P) = 36 - b_L P$, where $0 < b_H < b_L$ and $b_L < 2b_H$. The monopolist cannot tell which consumer has the higher demand and which has the lower demand, although he knows the two demand functions. The monopolist decides to sell the good in bundles or packages. Denote a package as a pair $(Q,V)$ where $Q$ is the number of units of the product and $V$ is the price of the entire package (not the price per unit). He considers three options:

**Option 1**: sell only one package, targeted to the consumer with high demand.

**Option 2**: sell two identical packages, designed in such a way that each consumer will buy one package.

**Option 3**: sell two different packages, one targeted to the high-demand consumer and the other to the low-demand consumer.

The monopolist has the following cost function: $C(Q) = 3Q$.

(a) Determine the profit maximizing package for option 1 and calculate the corresponding profits.

(b) Determine the profit maximizing package for option 2 and calculate the corresponding profits.

(c) For option 3 write the constraints that must be satisfied in order for each consumer to end up buying the package which is designed for her.

(d) Determine the profit maximizing packages for option 3.

(e) Assume that $b_H = 3$ and $b_L = 4$. Rank the three options based on the profits they yield. Calculate total surplus with the best (in terms of profit-maximization) of the three options. Calculate also the effective price(s) per unit.