Team 11

Assignment 7

1. Suppose that offers are only accepted if they are lower than previous offers.

```
2. class Low_Bid_Market extends Market {
3.     public void offer (Item item, Money price)
4.     // Requires: item is an element of wanted
5.     // Effects:  if (item, price) is not cheaper than any existing pair
6.     //         (item, existing_price) in offers do nothing
7.     //         else add (item, price) to offers
8.
```

   Is `Low_Bid_Market` a valid subtype of `Market`? Appeal to the methods rule to back up your answer.

Answer:

Yes, Low_Bid_Market is a valid subtype of Market class.

Method rule says that a subtype of a class is valid if its precondition is weaker than or the same as the corresponding method of its supertype or if its postcondition is stronger than or the same as the corresponding method of its supertype. In this case, the postcondition of Low_Bid_Market's offer method is stronger than Market's offer method.

To clarify, the offer method of the supertype Market adds any new (item, price) pair to the offers, but the offer method of the subtype Low Bid Market is more precise in that it only adds the new pair if it is cheaper than the current ones, otherwise it does nothing.

2. Suppose that the `buy()` method always chooses the lowest price on an item.

```
1. class Low_Offer_Market extends Market {

2.     public Money buy(Item item)

3.     // Requires: item is an element the domain of offers

4.     // Effects: choose and remove pair (item, price) with the

5.     //          lowest price from offers and return the chosen
   price
```

Is `Low_Offer_Market` a valid subtype of `Market`? Appeal to the methods rule to back up your answer.

Answer:

Yes, Low_Offer_Market is a valid subtype of Market. According to the rule, being a subtype needs to have weaker precondition and stronger postcondition. The buy() method in Low_Offer_Market has the same precondition and that's valid. For the postcondition, Low_Offer_Market buy() is more specific, because it will remove the pair with the lowest price and return the price, versus the one in Market buy() only remove some pair arbitrarily and return the price. Therefore, it satisfies the LSP rule, which means Low_Offer_Market is a valid subtype of Market.