Question 4:

1. is

For the above statement to hold, the following must hold for constant witnesses and .

Given that for ,

As increases, so does , this means that for any pair of witnesses and , there exists a value for which will make greater than , meaning the statement is is not true.

1. is

decreases as increases for , as for ( is undefined). For the witnesses this means that taking a value of yields , or , thus can be used. The witnesses show that is .

1. is
2. is
3. is

Question 5:

This is of the form , where , and . This is the second of the three cases in master theorem as , meaning the runtime in this case is .

TODO: Add witnesses…

For this runtime recurrence, , and .

Here , as this is not constant the runtime complexity cannot be resolved using the Master Theorem.

In this case, . The use of the Master Theorem requires thus here it cannot be used.

Question 6: