Please answer **all** of the following questions on a separate sheet:

1. Solve for x: , where  [10]
2. Solve for x and y

 [10]

1. If for all integers ,



show that  [20]

1. Let  , where  is a constant.
2. Prove that if , then  for all . [10]
3. Prove that if , then  for all . [10]
4. Find the range of values of  such that  for all. [10]

1. (i) Find the range of values of x for which. [10]

(ii) If and, find the value of  [10]

1. Show that simplifies to a constant. [10]

**Total = 100 marks**