
Name:**Entry No.:**

1. [**2 marks**] Prove that every simple graph has two vertices of the same degree.
2. [**2 marks**] Show that for every positive integer k there exist k consecutive composite numbers.
Hint: You may find the k consecutive composite numbers near $(k+1)!$ – e.g., if you are looking for 4 consecutive composite numbers, they can be (122, 123, 124, 125).
3. [**2 marks**] How many bitstrings are there of size $(n+k)$, with n zeros and k ones with the additional condition that no ones are adjacent? For example, if $n = 3$ and $k = 2$, the possible bitstrings are 00101, 01001, 01010, 10001, 10010, and 10100. Justify your answer briefly.