

True/False - No explanation needed. (2pts)

1. If $\lfloor x \rfloor \neq \lceil x \rceil$, then x is not an integer. True/False
2. For any 9 people in a line, all with different heights, we can find 4 people – without rearranging them and not necessarily consecutive – whose heights are already arranged in an increasing order, or in a decreasing order. True/False

Problems - Need justification. No justification means **zero**!

1. How many permutations of the letters $ABCDEFGH$ that A, B are adjacent, and C, D are adjacent? For example, we count strings like $BAECDFGH$. (5pts)

2. Prove that if n, k are integers with $1 \leq k \leq n$, then

$$k \binom{n}{k} = n \binom{n-1}{k-1}$$

(5 points)