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Individual Assignments #58

Assignment: 4.1: 6 (see definition of n! pg. 145), 8, 14, 18, 28, 38, 40

# Q6

Prove that: using induction.

Base Case

Check at k=1.

⟹ OK

Inductive Case

Assume that is true and that it implies .

So,

Thus, as assumed P(m)→P(m+1).

# Q8

Prove that using induction.

Base Case

Where n=0: ⟹OK

Inductive Case

Assume

So,

Thus, as assumed P(m)→P(m+1).

# Q14

Prove that using induction.

Base Case

Where n=1: ⟹OK

Inductive Case

Assume

So,

Thus, as assumed P(m)→P(m+1).

# Q18

1. .
2. is true because .
3. We must assume the inductive hypothesis is correct. For each that P(m) implies P(m+1).
4. by inductive hypothesis
5. Both the basis and inductive step are completed so by principle of mathematical induction the statement is true for every integer greater than 1.

# Q28

Prove that when using induction.

Base Case

Where n=3: ⟹OK

Inductive Case

Assume

Note: .

Note: .

Since the equality holds for .

Thus, as assumed P(m)→P(m+1).

# Q38

Base Case

is always true by definition.

Inductive Case

Assume

Let x be an arbitrary element of .

Because then by the inductive hypothesis . We also know that so by the given fact that thus . Therefore .

# Q40

Base Case

P(1)

Inductive Case

P(k)→P(k+1)

⎕