Name: ____

Show your work.

- 1. Consider the alphabet $\Sigma = \{1,0\}$. Let $c : \mathbb{N} \longrightarrow \mathbb{N}$ be the function such that the value c(n) for any given $n \in \mathbb{N}$ is the number of Σ -words of length n wherein the string 10 fails to appear.
 - (a) Specify the indicated values.
 - (i) c(0)

(i) _____

(ii) c(1)

(ii) _____

(iii) c(2)

(iii) _____

(iv) c(19)

(iv)_____

(b) Let p(n) express the following proposition:

$$\sum_{i=0}^{n} c(i) = \frac{(n+1)(n+2)}{2}.$$

To prove that proposition p(n) is true for every natural number $n \in \mathbb{N}$ by mathematical induction, carry out the following steps.

- (i) Specify the applicable base case.
- (i)

(i	i) In the space be	olow, establish tl	ne hase case by ma	thematical argume	entation	
(1	i) in the space be	now, establish ti	ic base case by ma	thematical argum	intation.	
(ii	i) Specify the app	olicable inducti	ve step.			
			(iii)			Ci ^{tA}
			**			
) 71 .6 1 .	<		ž¢.		
(iv	v) Identify the in	ductive hypothe	esis in the given in	ductive step.		
			(iv)			
(1	y). In the space be	olow, establish tl	ne inductive step b	y mathematical ar	gumentation.	
	y in the space of	.10 11) Cottabilion ti	ie maaetive step e	, matricinatical ar	Samemanon	
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Name:

Pedersen

2. Consider the function $\Phi: \mathbb{N} \longrightarrow \mathbb{N}$ for which $\Phi(n) = \min\left(n!, \frac{(2n)!}{2^n}\right)$ for each $n \in \mathbb{N}$. Let p(n) express the following proposition:

$$\Phi(n) = n$$

To prove that proposition p(n) is true for every natural number $n \in \mathbb{N}$ by mathematical induction, carry out the following steps.

(a) Specify the applicable base case.

(a)

(b) In the space below, establish the base case by mathematical argumentation.

(c) Specify the applicable inductive step.

(c) _____

(d) Identify the inductive hypothesis in the given inductive step.

(d) ____

(e) In the space below, establish the inductive step by mathematical argumentation.

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