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2017-2018 Spring Semester MATH 3050 Section 101 (Barsamian) Homework 6, Due Fri March 9, 2018

Problem:	1	2	3	4	5	6	7	8	9	10	Total	Rescaled
Your Score:												
Possible:	10	10	10	10	10	10	10	10	10	10	100	20

[1] The goal of this problem is to use Induction to prove Statement *S*:

$$Statement\ S\text{: } \forall n \in \boldsymbol{Z}, n \geq 0 (7^n - 2^n \ is\ divisible\ by\ 5)$$

Questions (a),(b),(c),(d),(e) are about identifying the parts. This is what goes on in the portion of the *Handout on Induction* titled *"Preliminary Work".*

(a) Write $P(n)$. **(b)** Write $P(0)$. **(c)** Write $P(k)$. **(d)** Write $P(k+1)$.

(e) In a proof of Statement S using the Method of Induction, what must be shown in the Inductive Step?

Question (f) is about actually doing the proof. This is what goes on in the portion of the *Handout on Induction* titled *"Build a proof of Statement S using the following structure".*

(f) Prove Statement *S* usingthe Method of Induction.

[2] Using a web site or Excel, make a table (with column headings) that compares the values of the three functions n^3 and 3^n and $n!$ for $n = 0,1,2, \ldots, 12$. Figure out how to print your table, with your name included in the computer printout. (I don't want your name to be hand-written.) Print the table and include it here.

[3] (a) From the three functions n^3 and 3^n and $n!$, pick one of the functions to play the role of $f(n)$ and another function to play the role of $g(n)$, and pick an integer value of "a" (the lowest possible value) to build a true statement of this form: $Statement\ S\text{: } \forall n \in \boldsymbol{Z}, n \geq a\big(f(n) < g(n)\big)$. (Write down your true Statement S.)

(b) Use the Method of Induction to prove your Statement S.

[4] (a) From the three functions n^3 and 3^n and $n!$, pick another pair of functions to play the role of $f(n)$ and $g(n)$, and again pick an integer value of "a" (the lowest possible value) to build another true statement of the form $Statement\ S\text{: } \forall n \in \boldsymbol{Z}, n \geq a\big(f(n) < g(n)\big)$. (Write down your true Statement S.)

(b) Use the Method of Induction to prove your Statement S.

In [5] – [10], be sure to present your solutions as equations, with left sides that name the quantity.

[5] 6.1 #12. Present each answer three ways: **(i)** Set Notation **(ii)** Interval Notation **(iii)** Number Line.

[6] 6.1#14 **[7]** 6.1#16 **[8]** 6.1#17 **[9]** 6.1#23

[10] 6.1#35 but using $A = \{c, d\}$ and $B = \{4,6\}$ and $C = \{6,7\}$.