

Ma 236 Introduction to Mathematical Reasoning

Homework 1

To be handed in on Thursday 1/26/17 at the beginning of class.

Check if the following argument is valid. First by searching for a counterexample and second by using a truth table.

$$\frac{P \rightarrow \neg R}{(P \wedge Q) \rightarrow R.}$$

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Homework 2

To be handed in on Thursday 2/2/17 at the beginning of class.

Convert the following argument to symbolic form and check if it is valid.

It is on a weekend if and only if it is on a Saturday or on a Sunday. Therefore it is on a weekend, since it is on a Sunday.

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Homework 3

To be handed in on Monday 2/6/17 at the beginning of class.

Use the tree method to find all truth assignments for A, B, C which make the sentences $(A \rightarrow B) \rightarrow C$ and $\neg(B \rightarrow C)$ true at the same time.

Homework 4 (Problem #3 a-c on page 30 of the text)

Homework 5 due in class: Problems 1b, 1c, 2d on page 48 of the text,

Ma 236 Homework 6

Due in class Monday, February 27

1. Find a formation tree for $\forall x (Wx \rightarrow Bx)$.
2. Use the formation tree from Part 1 to determine whether the sentence above is true or false in the following interpretation. Show your work.
 - (a) Domain is the class of all living things.
 - (b) Extension of B is all blue things.
 - (c) Extension of W is all winged horses.

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Homework 7

Due in class March 2, 2017

1. Test if the sentences

$$\forall x (Fx \rightarrow \exists y Gy)$$
$$\neg Ga$$

are consistent by using the tree method. Show that the tree goes on forever.

2. Find an interpretation with finite domain in which both sentences are true. Be sure to indicate the extensions of a , F and G . Use formation trees to show that the sentences are true in your interpretation.

Ma 236 Fall 2017

Homework 8

Due in class February March 6, 2017

1. Translate the following sentences into predicate logic.
 - (a) There is one and only one Elvis.
 - (b) If Mark Twain is Samuel Clemens, then Samuel Clemens wrote *Huckleberry Finn* (the book).
2. Use the tree method to determine if $\neg\forall x\forall y\neg x=y$ is a logical truth.

Homework 9

Problem 1(d) on page 97 of the text.

Homework 10

Use induction to prove 2(f) on page 97 of the text.

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Homework 11

Due in class April 10, 2017

Prove by induction that for all x in N

$$0 \times 1 + 1 \times 2 + \cdots + x \times (x + 1) = \frac{x \times (x + 1) \times (x + 2)}{3}.$$

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Homework 12

Due in class April 24, 2017

For any sequence σ of 0's and 1's, $\sigma\sigma$ is the sequence obtained by writing σ twice. If $\sigma = 0110$, then $\sigma\sigma = 01100110$.

1. Estimate the Kolmogorov complexity of $\sigma\sigma$ in terms of $|\sigma|$, the length of σ .
2. Is $\sigma\sigma$ incompressible? Why or why not?