

MATH3224 - Graded Homework 2 - Summer 1- 04 - Konaté

Notice: Show your work. A right answer with a bad reasoning will be considered as wrong.

Responding right to each question is worth 20 points.

1 • For two sets A and B , we define a third set C by

$$C = A - B = \{x \in A \text{ and } x \notin B\}.$$

Consider $A = \{a, c, h, b\}$ and $B = \{e, d, a, c\}$.

Find $A - B$ and $B - A$. Compare.

2 • For three given sets A, B and C prove

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C).$$

3 • Prove

$$1 + \frac{1}{2} + \frac{1}{4} + \cdots + \frac{1}{2^n} = 2 - \frac{1}{2^n} \quad \text{and}$$

$$2n + 1 \leq 2^n \quad \text{for } n \geq 3.$$

4 •

4.1 Prove $(\forall x \in \mathbf{R})(\forall y \in \mathbf{R}) \left(0 < x < y \implies \frac{1}{x} > \frac{1}{y}\right)$

4.2 Prove $(\forall x \in \mathbf{R})(x > 0) (x^2 < x \implies x < 1)$.

5 • Consider two functions

$$f(x) = x \ln(x); \quad g(x) = x^2.$$

Find $Dom(f)$, $Ran(f)$; $Dom(g)$, $Ran(g)$.

Find $f \circ g$ and $g \circ f$. Compare
