

MATAKULIAH : Matematika Diskrit	KELAS : A-D
Dosen : Eko Wahyu Tyas, Amalia Utamima	Sifat : TERBUKA 1 lembar A4
Durasi Waktu Pelaksanaan : 120 Menit	Hari/Tanggal :

- The inhabitants of Joy Island consist of knights and knaves. Knights always tell the truth while knaves always lie. You encounter two people A and B. Determine if possible, what A and B if they address you in the ways described: A says "B is a knight" and B says "The two of us are opposite types? (10 points)
- Suppose there are signs on the doors to two rooms. The sign on the first door reads "In this room there is a lady, and in the other one there is a tiger"; and the sign on the second door reads "In one of these rooms, there is a lady, and in one of them there is a tiger." Suppose that you know that one of these signs is true and the other is false. Behind which door is the lady? (5 points)
- Find a counterexample, if possible, to these universally quantified statements, where the domain for all variables consists of all integers. (15 points)
 - $\forall x(x^2 \geq x)$
 - $\forall x(x > 0 \vee x < 0)$
 - $\forall x(x = 1)$
- Suppose that students in the school can take 2 or more majors at the same time. Find the symmetric difference of the set of computer science majors at a school and the set of mathematics majors at this school. (5 points)
- Proof that for all real numbers x and y , if $x+y \geq 2$, then either $x \geq 1$ or $y \geq 1$. (10 points)
- Proof that $A \cap B = B - (B - A)$. (Specify the law you used in every steps). (10 points)
- Show that $(p \rightarrow r) \wedge (q \rightarrow r)$ and $(p \vee q) \rightarrow r$ are logically equivalent. (10 points)
- Show that $(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)$ is a tautology. (10 points)
- Proof the following theorem: For integers m and n , if mn is even then m is even or n is even. (10 points)
- Given the following hypotheses: If the Chargers get a good linebacker, then the Chargers can beat the Broncos. If the Chargers can beat the Broncos, then the Chargers can beat the Jets. If the Chargers can beat the Broncos, then the Chargers can beat the Dolphins. The Chargers get a good linebacker. Show by using the rules of inference that the conclusion, the Chargers can beat the Jets and the Chargers can beat the Dolphins, follows from the hypotheses. (Hint: you can process or combine a hypothesis twice or more to get the desired conclusion) (15 points)