Latihan Soal Persiapan UTS Matdis

2. Which of these are propositions? What are the truth values of those that are propositions?

a) Do not pass go.
b) What time is it?
c) There are no black flies in Maine.
d) $4 + x = 5$.
e) The moon is made of green cheese.
f) $2^n \geq 100$.

7. Express these system specifications using the propositions p: "The message is scanned for viruses" and q: "The message was sent from an unknown system" together with logical connectives (including negations).

a) "The message is scanned for viruses whenever the message was sent from an unknown system."

b) "The message was sent from an unknown system but it was not scanned for viruses."

c) "It is necessary to scan the message for viruses whenever it was sent from an unknown system."

d) "When a message is not sent from an unknown system it is not scanned for viruses."

19. Determine whether each of these conditional statements is true or false.

a) If $1 + 1 = 2$, then $2 + 2 = 5$.
b) If $1 + 1 = 3$, then $2 + 2 = 4$.
c) If $1 + 1 = 3$, then $2 + 2 = 5$.
d) If monkeys can fly, then $1 + 1 = 3$.

19. Determine whether $(\neg q \wedge (p \rightarrow q)) \rightarrow \neg p$ is a tautology.

35. Express the negation of each of these statements in terms of quantifiers without using the negation symbol.

a) $\forall x(x > 1)$
b) $\forall x(x \leq 2)$
c) $\exists x(x \geq 4)$
d) $\exists x(x < 0)$
e) $\forall x((x < -1) \vee (x > 2))$
f) $\exists x((x < 4) \vee (x > 7))$

61. Let $P(x)$, $Q(x)$, and $R(x)$ be the statements "x is a professor," "x is ignorant," and "x is vain," respectively. Express each of these statements using quantifiers; logical connectives; and $P(x)$, $Q(x)$, and $R(x)$, where the domain consists of all people.

a) No professors are ignorant.

b) All ignorant people are vain.

c) No professors are vain.

d) Does (c) follow from (a) and (b)?

23. Translate in two ways each of these statements into logical expressions using predicates, quantifiers, and logical connectives. First, let the domain consist of the students in your class and second, let it consist of all people.

a) Someone in your class can speak Hindi.
b) Everyone in your class is friendly.
c) There is a person in your class who was not born in California.
d) A student in your class has been in a movie.
e) No student in your class has taken a course in logic programming.

33. Express each of these statements using quantifiers. Then form the negation of the statement, so that no negation is to the left of a quantifier. Next, express the negation in simple English. (Do not simply use the phrase "It is not the case that.")

a) Some old dogs can learn new tricks.
b) No rabbit knows calculus.
c) Every bird can fly.
d) There is no dog that can talk.
e) There is no one in this class who knows French and Russian.

15. For each of these arguments determine whether the argument is correct or incorrect and explain why.

a) All students in this class understand logic. Xavier is a student in this class. Therefore, Xavier understands logic.
b) Every computer science major takes discrete mathematics. Natasha is taking discrete mathematics. Therefore, Natasha is a computer science major.
c) All parrots like fruit. My pet bird is not a parrot. Therefore, my pet bird does not like fruit.
d) Everyone who eats granola every day is healthy. Linda is not healthy. Therefore, Linda does not eat granola every day.

38. Find $f \circ g$ and $g \circ f$, where $f(x) = x^2 + 1$ and $g(x) = x + 2$, are functions from **R** to **R**.

- Bilangan Cacah (*natural number*)

  N = {0, 1, 2, 3, …}
- Bilangan Bulat **Z** = {…, -2, -1, 0, 1, 2, …}
- Bil. Bulat Positif $\mathbf{Z^+}$ = {1, 2, 3, 4, …}
- Bil. Riil **R** = {47.3, -12, π, …}
- Bil. Rasional **Q** = {1.5, 2.6, -3.8, 15, …}

22. Find the sum and product of each of these pairs of numbers. Express your answers as a base 3 expansion.

a) $(112)_3, (210)_3$
b) $(2112)_3, (12021)_3$
c) $(20001)_3, (1111)_3$
d) $(120021)_3, (2002)_3$

30. Find the integer a such that

a) $a \equiv 43 \pmod{23}$ and $-22 \leq a \leq 0$.
b) $a \equiv 17 \pmod{29}$ and $-14 \leq a \leq 14$.
c) $a \equiv -11 \pmod{21}$ and $90 \leq a \leq 110$.

Apakah bijection? Onto?

from $\mathbf{R}$ to $\mathbf{R}$.

a) $f(x) = -3x + 4$
b) $f(x) = -3x^2 + 7$