

2701 Example Questions

Fall 2007

- Write out the truth table for $(p \vee r) \vee (q \wedge \sim p \wedge \sim r)$.
 - Simplify this expression.
- Write each of the following in symbols using p, q, \sim, \Rightarrow .
 - p is necessary for q .
 - p is sufficient for q .
 - p is true whenever q is true.
 - Only if p is true will q be true.
 - p is true unless q is true.
- Convert DAD_{16} from its hexadecimal expansion to its decimal (base 10) expansion.
- Convert 11 from its decimal (base 10) expansion to its binary (base 2) expansion.
- Evaluate the C expression $(-11) \& 6$.
- What is $\gcd(14, 25)$?
 - Write the gcd of 14 and 25 as a linear combination of 14 and 25.
- Evaluate $66^{100} \bmod 99$. [Hint: try $66^2 \bmod 99$ first.]
- Show that for any integer x , $x^2 \equiv 0$ or $1 \pmod{4}$.
- Determine the truth value of each of these statements where x and y are real numbers:
 - $\forall x: \exists y: x^2 = y$,
 - $\exists x: \forall y: x^2 = y$,
 - $\exists x: \forall y: xy = 0$.
- Let $A = \{1, 2, 3\}$ and $B = \{0, 1, 3\}$. Find
 - $A \cup B$; (b) $A \cap B$; (c) $A \setminus B$; (d) $B \oplus A$; (e) $B \times A$.
- How many license plates can be made using either two letters followed by four digits or two digits followed by four letters?
- How many ways are there of dividing up 10 (identical) hats among three people (some people may get no hats).
- How many integers between 1 and 100 are not divisible by either 4 or 5?