Plagiarism will earn you an F in the course and a recommendation of expulsion from the university.

1. $\mathrm{T} \wedge (\mathrm{F} \vee \mathrm{T}) =$
    a. T
    b. F
2. $(\mathrm{T} \wedge \mathrm{F}) \vee \mathrm{T} =$
    a. T
    b. F
3. Which of the following are propositions? Choose all that are correct.
    a. Is the Super Bowl being played tomorrow?
    b. Today is Saturday.
    c. Good luck on the exam.
    d. There is an exam today.
    e. 17 is a prime number.
    f. 10 is a prime number.
    g. It will rain tomorrow.
4. Is the following truth table both complete and correct? Answer "Yes" or "No".

p	q	r	$(\mathrm{p} \vee \mathrm{r}) \wedge \neg q$
T	T	T	F
T	T	F	F
T	F	T	T
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	T
F	F	F	F

5. Which of the following are predicates? Choose all that are correct.
    a. Let P(x) be defined to be "17 is a prime number."
    b. Let P(x) be defined to be "$\frac{1}{1+x} < 1$."
    c. $\frac{1}{3} < 1$.
    d. There are 27 questions on this exam.
6. $p \oplus q$ is true in the following case(s). Choose all that apply.
    a. *p* is true. *q* can be true or false.
    b. q is true. *p* can be true or false.
    c. *p* is true and *q* is false.
    d. *p* is false and *q* is true.
    e. *p* and *q* are both true.
    f. *p* and *q* are both false.
7. $\neg p \vee \neg q \equiv \neg(p \wedge \neg q)$
    a. True
    b. False
8. $p \wedge q \equiv \neg(p \wedge q)$
    a. True
    b. False

For questions 9-14, consider the following sets:

A={17,52,21,36}, B={17,21,52,36}, C={14,17,21,36,52}, D={ $x \in \mathbf{Z}$: x is odd }

9. Choose all that are correct.
   a. $A \subset B$
   b. $B \subset A$
   c. $A \subseteq D$
   d. $D \subseteq A$
   e. $A \neq B$
10. Choose all that are correct.
   a. $A \cap B = \{21\}$
   b. $A \cap B = \{17,21\}$
   c. $C \cap D = \{36,52\}$
   d. $A \cap D = \{21\}$
   e. $A \cap D = \{17,21,36,52\}$
11. Choose all that are correct.
   a. $A \cup B = \{17,21,36,52\}$
   b. $A \cup B = \{21\}$
   c. $A \cup D = \{17,21\}$
   d. $A \cup D = \{17\}$
12. Choose all that are correct.
   a. $17 \in A$
   b. $17 \in B$
   c. $17 \in C$
   d. $17 \in D$
13. Choose all that are correct
   a. $A \cup B = \{\emptyset\}$
   b. $A \cup B = \emptyset$
   c. $A \cap B = \{\emptyset\}$
   d. $A \cap B = \emptyset$
14. Choose all that are correct.
   a. $A \cup B \cup C = D$
   b. $A \cap D = \{17\}$
   c. $A \cap D = 17$
   d. $A \cup B \cap D = \{17\}$
   e. $A \cup B \cap D = 17$

15. Choose all that are correct.
    a. $2^x 2^y = 2^{x+y}$
    b. $(2^x)^y = 2^{x+y}$
    c. $2^x 2^y = 2^{xy}$
    d. $(2^x)^y = 2^{xy}$
16. Let $c(x) = 2^x$, where *x* is a positive integer. Choose all that are correct.
    a. *c* is neither one-to-one nor onto.
    b. *c* is one-to-one but not onto.
    c. *c* is onto but not one-to-one.
    d. *c* is both one-to-one and onto.
17. Choose all that are correct.
    a. $\lfloor 10.9 \rfloor = 10$
    b. $\lceil 10.9 \rceil = 10$
    c. $\lfloor 10.1 \rfloor = 10$
    d. $\lceil 9.9 \rceil = 10$
    e. $\lceil 9.1 \rceil = 10$
18. Choose all that are correct.
    a. $\log_2 16 = 4$
    b. $\log_2 16 = 8$
    c. $\log_4 16 = 2$
    d. $\log_4 16 = 4$
19. $(A \cap B) \cap C = A \cap (B \cap C)$ is an example of which law.
    a. De Morgan's Law
    b. Law of Diminishing Returns
    c. Associative Law
    d. Commutative Law
    e. Murphy's Law
20. Choose all that are correct. $\sum_{i=1}^{n} i =$
    a. n^2
    b. $\frac{n(n+1)}{2}$
    c. $\frac{(n-1)(n+1)}{2}$
    d. n^3

21. Let $X = \{u, v, w, y\}$. Define a function $g: X \to X$ to be $g = \{(u, v), (v, w), (w, y), (y, u)\}$. What is $g^{-1}(x)$? Choose all that are correct.
    a. {(*u*,*w*)}
    b. {(*y*,*u*),(*w*,*y*),(*v*,*w*),(*u*,*v*)}
    c. {(*w*,*u*)}
    d. {(*v*,*u*),(*w*,*v*),(*y*,*u*),(*w*,*y*)}
    e. {(*v*,*u*),(*w*,*v*),(*y*,*w*),(*u*,*y*)}
22. $\sum_{j=0}^{n} 2^j$=
    a. $2^j + \sum_{j=0}^{n-1} 2^j$
    b. $2^{n-1} + \sum_{j=0}^{n-1} 2^j$
    c. $2^n + \sum_{j=0}^{n-1} 2^j$
    d. $2^n + \sum_{j=0}^{n} 2^j$
    e. $1 + \sum_{j=1}^{n-1} 2^j$
23. What is $7 \times 7 - 7 \div 7$?
    a. 42 / 7
    b. 0
    c. 42
    d. 50
    e. 48
24. Choose all that are arithmetic sequences.
    a. $\{3, 1, -1, -3, -5, -7\}$
    b. {5, 4, 6, 3, 7, 2, 8}
    c. {5, -5, 5, -5, 5, -5}
    d. $\{1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}\}$
    e. $\{1, 2, 4, 8, 16, 32, \dots\}$
25. Choose all that are geometric sequences.
    a. $\{3, 1, -1, -3, -5, -7\}$
    b. {5, 4, 6, 3, 7, 2, 8}
    c. {5, -5, 5, -5, 5, -5}
    d. $\{1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}\}$
    e. $\{1, 2, 4, 8, 16, 32, \dots\}$

Extra Credit

26. Prof. Miller works in which areas? Choose all that are correct.
    a. Compilers
    b. Programming Languages
    c. Parallel Algorithms
    d. Molecular Structure Determination
27. Dr. Miller earned his Ph.D. from which institution?
    a. SUNY-Albany
    b. SUNY-Binghamton
    c. SUNY-Buffalo
    d. SUNY-Stony Brook
    e. University of California, San Diego

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