

Exam 2

Remember: Leave me some bread crumbs.
You can do this! Stay calm and believe in yourself.

1. Write the statement “The stapler is empty or the stapler is jammed” in the “if...then” form. **3 points**

2. Write the negation of the statement. Do not use “not all” or “it is not true that”. **2 points each**
 - a) All pens use ink.

 - b) Some people drink milk.

 - c) No rabbits wear glasses.

3. Convert $151,760_{\text{ten}}$ to base 16. **4 points**

4. Write 42,120 as a Roman numeral. **3 points**

5. Use the Russian peasant method to multiply: $\begin{array}{r} 237 \\ \times 158 \\ \hline \end{array}$ **4 points**

5. On a 3-by-5 card, write three sentences:
- a) This sentence contains five words.
 - b) This sentence contains eight words.
 - c) Exactly one sentence on this card is true.

Which statement(s) are true, and which false?
4 points

6. Given the statement:

If you eat your spinach, you will be strong.

2 points each

a) Write the converse.

b) Write the inverse.

c) Write the contrapositive.

d) Write the negation of this statement in its conjunctive form.

e) Write the given statement in its equivalent disjunctive form.

6. Write 144,768 as a Mayan numeral. **4 points**

7. Use an Euler diagram to test the validity of the following argument.
4 points

Some students are dangerous.

All dangerous people are crazy.

Some students are not crazy.

8. Convert 10011100101_{two} to base 10. **4 points**

9. Do the following arithmetic problems. **4 points each**

a)
$$\begin{array}{r} 7103_{\text{eight}} \\ -4537_{\text{eight}} \\ \hline \end{array}$$

b)
$$\begin{array}{r} 34_{\text{five}} \\ \times 34_{\text{five}} \\ \hline \end{array}$$

c)
$$\begin{array}{r} 8765_{\text{nine}} \\ +3846_{\text{nine}} \\ \hline \end{array}$$

10. Is the following statement true or false? Explain. **2 points**
If $2 + 2 = 5$, then $2 \times 3 = 6$.

11. Construct a truth table for the statement:

$$\sim [(p \rightarrow (q \vee \sim r)) \wedge (\sim q \leftrightarrow p)]$$

12. Use one of DeMorgan's Laws to write an equivalent statement. **2 points each**

a) It is not true that today is Monday and I do not have an exam.

b) I am not busy and I am going out tonight for dinner.

13. Convert 5324_{six} to base 10. **4 points**

16. Symbolize each argument using the suggested abbreviations. Then determine the validity of the argument by determining which of the argument forms is used. **3 points each**

Modus Ponens (Law of Direct Reasoning)

Modus Tollens (Law of Contraposition)

Law of Syllogism

Disjunctive Syllogism

Fallacy of the Converse

Fallacy of the Inverse

- a) If you study logic (s), mathematics is easy (e).
Mathematics is not easy.
Therefore, you did not study logic.
- b) If there is smoke (s), then there is fire (f).
There is fire.
Therefore, there is smoke.
- c) If you eat your spinach (e), then you can go out and play (p).
You did not eat your spinach.
Therefore, you cannot go out and play.
- d) We criminalize drugs or we damage the future of young people.
We will not damage the future of young people.
Therefore, we criminalize drugs.

17. Perform the following arithmetic problems using clock arithmetic. **2 points each**

a) $11 + 9$

b) $2 - 9$

c) $4 + 11 - 9$

18. Find all whole number solutions to $(5x + 3) \equiv 2 \pmod{9}$. **4 points**

18. Solve the following cryptarithmic problems. **4 Points**

$$\begin{array}{r} \text{S E N D} \\ + \text{M O R E} \\ \hline \text{M O N E Y} \end{array}$$

19. Use the Casting Out Nines Method (Nines Complement Method) to do the following subtraction problems. **4 points each**

a)
$$\begin{array}{r} 23,145 \\ -17,689 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 6122_{seven} \\ -4365_{seven} \\ \hline \end{array}$$

20. Write \overline{XCCDVI} in base 10. **3 points**