1.) **For each conditional below, do the following:** **[20 Points]**

(i) Identify both the hypothesis and conclusion
(ii) Rewrite the conditional in "If ____, then ____ " form (if applicable).
(iii) Write the converse in "If ___, then ___" form.
Is the **converse** true or false? If false, provide a counterexample.
(iv) Finally, write the inverse and contrapositive in "If ___, then ___" form (clearly labeling each).

(A) **If it is Thursday, then students have to attend classes at CHS.**

Hypothesis:	It is Thursday
Conclusion:	Students have to attend classes at CHS.
Converse:	If students have to attend classes at CHS, then it is Thursday.
	FALSE (Friday)
Inverse:	If it is not Thursday, then students do not have to attend classes at CHS.
Contrapositive:	If students do not have to attend classes at CHS, then it is not Thursday.

(B) **Angles are complementary when their measures add to 90°.**

Hypothesis:	Angle measures add to 90°
Conclusion:	They are complementary.
Conditional:	If angles have measures that add to 90°, then they are complementary.
Converse:	If angles are complementary, then their measures add to 90°.
	TRUE
Inverse:	If angles do not have measures that add to 90, then they are not complementary.
Contrapositive:	If angles are not complementary, then their measures do not add to 90°.

(C) **We do not attend school on New Year's Day.**

Hypothesis:	It is New Year's Day
Conclusion:	We do not attend school.
Conditional:	If it is New Year's Day, then we do not attend school.
Converse:	If we do not attend school, then it is New Year's Day.
	FALSE (Thanksgiving)
Inverse:	If it is not New Year's Day, then we attend school.
Contrapositive:	If we attend school, then it is not New Year's Day.

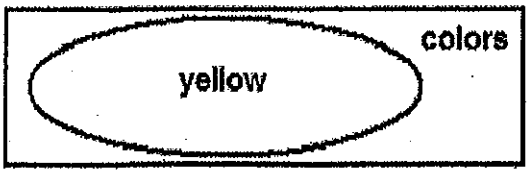
(D) **Angles that measure 140° are obtuse.**

Hypothesis:	Angles measure 140°.
Conclusion:	They are obtuse.
Conditional:	If angles measure 140°, then they are obtuse.
Converse:	If angles are obtuse, then they measure 140°.
	FALSE (150°)
Inverse:	If angles do not measure 140°, then they are not obtuse.
Contrapositive:	If angles are not obtuse, then they do not measure 140°.

(E) **All Canfield High School students have a locker.**

Hypothesis:	He/she is a Canfield High School student.
Conclusion:	He/she has a locker.
Conditional:	If he/she is a Canfield High School student, then he/she has a locker.
Converse:	If he/she has a locker, then he/she is a Canfield High School student.
	FALSE (Boardman High School students)
Inverse:	If he/she is not a Canfield High School student, then he/she does not have a locker.
Contrapositive:	If he/she does not have a locker, then he/she is not a Canfield High School student.

2.) Given the Euler diagram, write a corresponding conditional statement.
Then write its inverse, converse, and contrapositive (clearly labeling each one). **[5 Points]**



Conditional: If it is yellow, then it is a color.
Converse: If it is a color, then it is yellow.
Inverse: If it is not yellow, then it is not a color.
Contrapositive: If it is not a color, then it is not yellow.

3.) Order the conditional statements (if possible) to form a logical chain. **[6 Points]**
If you cannot form a logical chain, explain why.
Write the overall meaning of the chain when finished.

Possible Logical Chain?

2 - If you have a calculator, then you can do math homework quickly.
1 - If you go to Wal-Mart, then you buy a calculator.
4 - If you eat ice cream, you get a headache.
3 - If you do your math homework quickly, then you eat ice cream.

Possible Logical Chain?

None!
- If you go to the movies, you spend money.
- If you buy popcorn, you need something to drink.
- If you spend money, you buy popcorn.
- If you buy a movie ticket, you need something to drink.

Conclusion duplicated, never a hypothesis!

Overall: If you go to Wal-Mart, then you get a headache.

Create a logical chain of **at least ten conditionals** that has the overall meaning: **[4 Points]**
"If you attend math class, then you will have a wonderful weekend."

(Graded individually.)

5.) Complete the missing statement in each logical syllogism. **[4 Points]**

Syllogism A
(A1) All teachers grade papers.
(A2) Mr. Hamilton is a teacher.
(A3) ???

Mr. Hamilton grades papers.

Syllogism B
(B1) All athletes lift weights.
(B2) ???
(B3) Tom Brady lifts weights.

Tom Brady is an athlete

6.) Create three logical syllogisms of your own. Be creative! **[6 Points]**

Graded individually

7.) Create a two column proof of the fact that x = 3 is the solution to $4(x - 2) + 5 = -2(x - 7) + 1$. **[4 Points]**

S	R
(1) $4(x-2)+5=-2(x-7)+1$	(1) Given
(2) $4x-8+5=-2(x-7)+1$	(2) Distribute > "could" be combined
(3) $4x-8+5=-2x+14+1$	(3) Distribute
(4) $4x-3=-2x+14+1$	(4) Simplify > "could" be combined
(5) $4x-3=-2x+15$	(5) Simplify
(6) $6x-3=15$	(6) Addition
(7) $6x=18$	(7) Addition
(8) $x=3$	(8) Division

8.) In which row does the number 2011 appear in the following number pattern (if it continues this way)? **Justify your answer thoroughly!** **[3 Points]**

Row 1: (1) $=1^2$
Row 2: 2 3 (4) $=2^2$
Row 3: 5 6 7 8 (9) $=3^2$
Row 4: 10 11 12 13 14 15 (16) $=4^2$
Row 5: 17 18 19 20 21 22 23 24 (25) $=5^2$

Row n ends with n^2

$\sqrt{2011} = 44.84$

Row 44 ends with $44^2 = 1936$

Row 45 ends with $45^2 = 2025$

Thus, 2011 is in Row 45.

9.) In which row does the number 20,112,011 appear in the following number pattern (if it continues this way)? **Justify your answer thoroughly!**

[3 Points]

Row 1:					1	(2)	= 1·2			
Row 2:				3	4	5	(6)	= 2·3		
Row 3:			7	8	9	10	11	(12)	= 3·4	
Row 4:		13	14	15	16	17	18	19	(20)	= 4·5
Row 5:	21	22	23	24	25	26	27	28	29	(30) = 5·6

Row n ends with $n(n+1) \approx n^2$

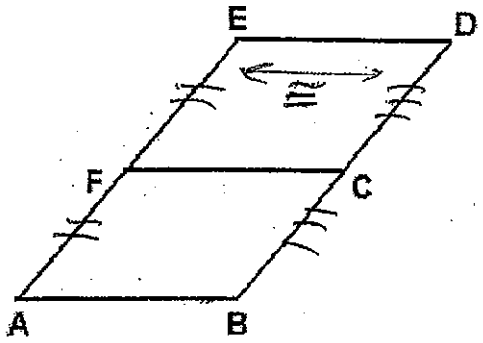
$\sqrt{20\,112\,0} = 4484.64$

Row 4484 ends with $4484(4485) = 20,110,740$

Row 4485 ends with $4485(4486) = 20,119,710$

So 20,112,011 is in Row 4485.

10.) Provide a proof of the following: **[5 Points]**



Given:

$\overline{EF} \cong \overline{DC}$

$\overline{FC}$ bisects both $\overline{EA}$ and $\overline{DB}$

Prove:

$\overline{EA} \cong \overline{DB}$

S	R
(1) $\overline{EF} \cong \overline{DC}$ $\overline{FC}$ bisects $\overline{EA}$ and $\overline{DB}$	(1) Given
(2) $\overline{EF} \cong \overline{FA}$ $\overline{DC} \cong \overline{CB}$	(2) Def of bisector
(3) $EF = FA$ $DC = CB$	(3) Def of $\cong$ segs
(4) $EF = DC$	(4) Def of $\cong$ segs
(5) $EF + FA = EA$ $DC + CB = DB$	(5) SAP
(6) $EF + EF = EA$ $DC + DC = DB$	(6) Substitution
(7) $EF + EF = EA$ $EF + EF = DB$	(7) Substitution
(8) $EA = DB$	(8) Transitive
(9) $\overline{EA} \cong \overline{DB}$	(9) Def of $\cong$ segs

11