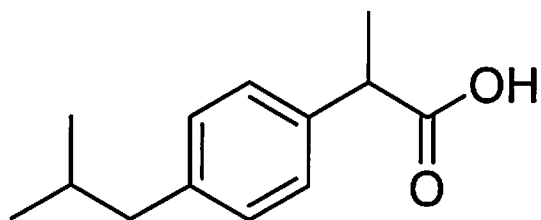


Name _____

1-10 are True / False (10pts)

- 1) Enantiomers are non-superimposable mirror images.
- 2) Single bonds are typically shorter and stronger than double bonds.
- 3) S_N2 reactions generate 100% inversion of stereochemistry because the nucleophile must attack from directly behind the Carbon – Leaving Group bond.
- 4) (R) or (S) stereocenters are assigned according to rules of the Cahn-Ingold-Prelog convention.
- 5) An *elimination* is a reaction where two atoms or groups are removed to produce a new π bond.
- 6) Hex-1-ene and Cyclohexane are stereoisomers.
- 7) A diastereomer is a stereoisomer which is not an enantiomer.
- 8) Saytzeff's rule states that the major product from an elimination will be the more highly alkyl substituted π bond.
- 9) A Leaving Group must be a good Proton donor.
- 10) Hydrogen Bromide and Peroxides is the reagent set used to add H and Cl, with Anti-Markovnikov regiochemistry, with Syn stereochemistry to alkenes.

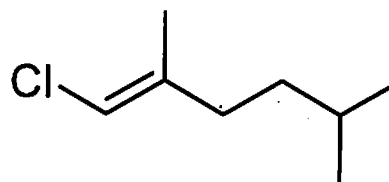
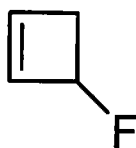
11) (5pts) Below is Ibuprofen, a nonsteroidal anti-inflammatory drug (NSAID) that is used for treating pain, fever, and inflammation. It is available under trade names, including Advil and Motrin. It is the #1 selling OTC pain reliever in the USA.



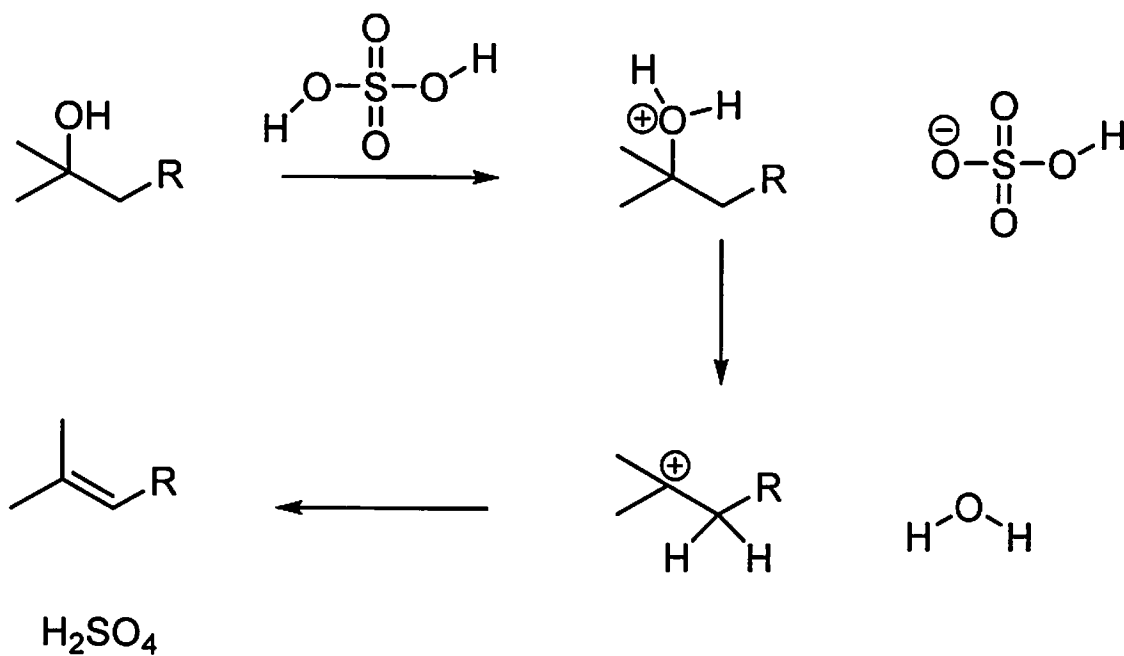
Determine:

- The number of Carbons.
- The number of Hydrogens.
- The number of π bonds.
- The number of chiral centers.
- Based on your answer to (d) – how many different stereoisomers fit the above (imprecise) structural representation?

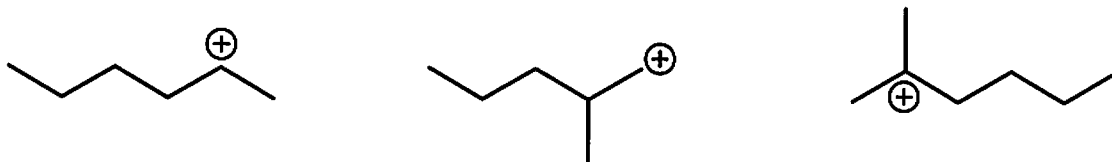
12) (3+4=7pts) Name these two compounds in IUPAC form.



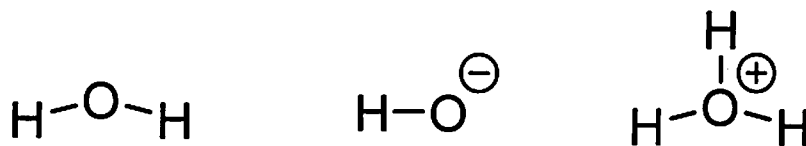
13) (4pts) Draw in the curly arrows for this acid catalyzed elimination.



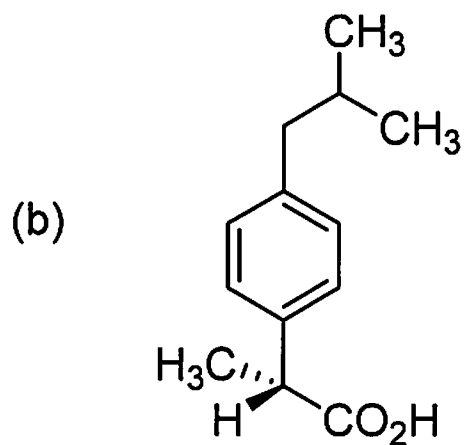
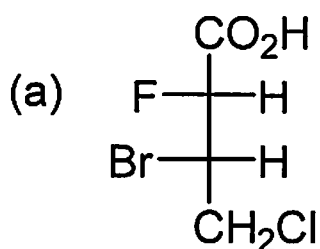
14) (1pt) Circle the most stable cation in this trio.



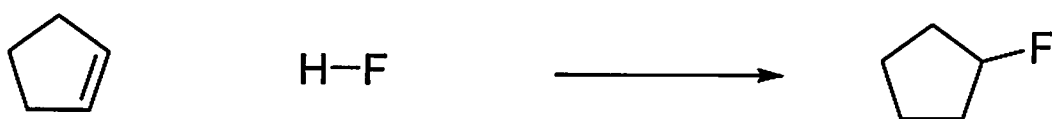
15) (1pt) Circle the species in this trio that is the better nucleophile.



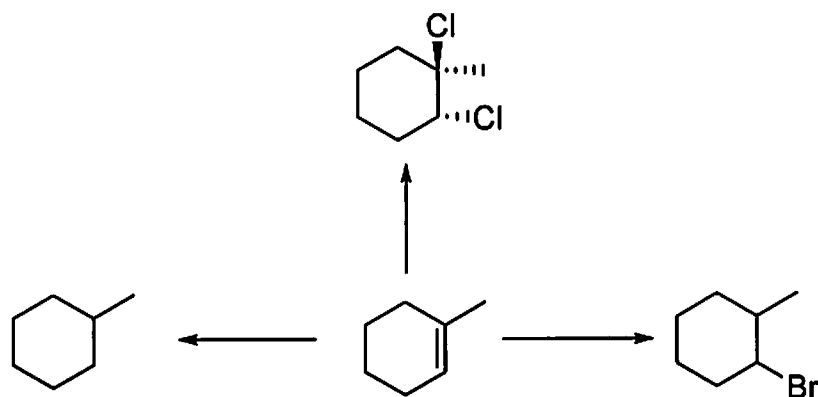
16) (6pts) Assign (R) or (S) to every chiral center in the following molecules.



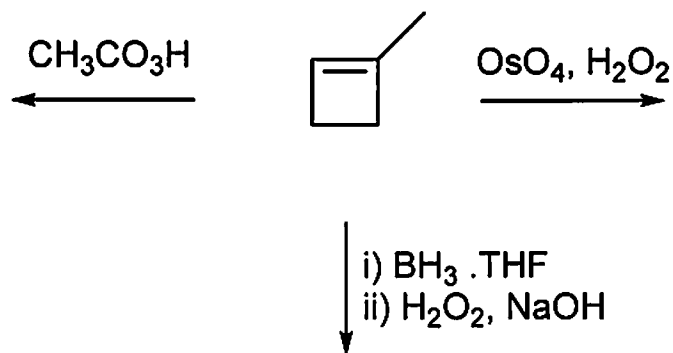
17) (4pts) Draw the mechanism (i.e. *using curly arrows*) for this electrophilic addition of hydrogen fluoride to cyclopentene.



18) Give the reagents for the following reactions. (6pts)



19) (6pts) Give the products formed in the following transformations of the below cyclic alkene, *paying attention to stereo- and regio-chemistry where relevant.*



****Up to TWO BONUS POINTS****

Provide the opposite of the following chemical terms.

Inversion (of stereochemistry)

Saytzeff (product)

Hydrogen	1	H	Helium	2	He
Lithium	3	Li	Boron	5	B
Beryllium	4	Be	Carbon	6	C
Boron	5	B	Nitrogen	7	N
Oxygen	8	O	Oxygen	8	O
Fluorine	9	F	Fluorine	9	F
Neon	10	Ne	Neon	10	Ne
Sodium	11	Na	Sodium	11	Na
Magnesium	12	Mg	Magnesium	12	Mg
Aluminum	13	Al	Aluminum	13	Al
Silicon	14	Si	Silicon	14	Si
Phosphorus	15	P	Phosphorus	15	P
Sulfur	16	S	Sulfur	16	S
Chlorine	17	Cl	Chlorine	17	Cl
Argon	18	Ar	Argon	18	Ar
Potassium	19	K	Potassium	19	K
Calcium	20	Ca	Calcium	20	Ca
Scandium	21	Sc	Scandium	21	Sc
Titanium	22	Ti	Titanium	22	Ti
Vanadium	23	V	Vanadium	23	V
Chromium	24	Cr	Chromium	24	Cr
Manganese	25	Mn	Manganese	25	Mn
Iron	26	Fe	Iron	26	Fe
Cobalt	27	Co	Cobalt	27	Co
Nickel	28	Ni	Nickel	28	Ni
Copper	29	Cu	Copper	29	Cu
Zinc	30	Zn	Zinc	30	Zn
Gallium	31	Ga	Gallium	31	Ga
Germanium	32	Ge	Germanium	32	Ge
Arsenic	33	As	Arsenic	33	As
Selenium	34	Se	Selenium	34	Se
Bromine	35	Br	Bromine	35	Br
Krypton	36	Kr	Krypton	36	Kr
Rubidium	37	Rb	Rubidium	37	Rb
Strontium	38	Sr	Strontium	38	Sr
Yttrium	39	Y	Yttrium	39	Y
Zirconium	40	Zr	Zirconium	40	Zr
Niobium	41	Nb	Niobium	41	Nb
Molybdenum	42	Mo	Molybdenum	42	Mo
Technetium	43	Tc	Technetium	43	Tc
Ruthenium	44	Ru	Ruthenium	44	Ru
Rhodium	45	Rh	Rhodium	45	Rh
Palladium	46	Pd	Palladium	46	Pd
Silver	47	Ag	Silver	47	Ag
Cadmium	48	Cd	Cadmium	48	Cd
Indium	49	In	Indium	49	In
Tin	50	Sn	Tin	50	Sn
Antimony	51	Sb	Antimony	51	Sb
Tellurium	52	Te	Tellurium	52	Te
Iodine	53	I	Iodine	53	I
Xenon	54	Xe	Xenon	54	Xe
Cesium	55	Cs	Cesium	55	Cs
Barium	56	Ba	Barium	56	Ba
Lanthanum	57	La	Lanthanum	57	La
Cerium	58	Ce	Cerium	58	Ce
Praseodymium	59	Pr	Praseodymium	59	Pr
Neodymium	60	Nd	Neodymium	60	Nd
Europium	61	Pm	Europium	61	Pm
Samarium	62	Sm	Samarium	62	Sm
Gadolinium	63	Eu	Gadolinium	63	Eu
Terbium	64	Gd	Terbium	64	Gd
Dysprosium	65	Tb	Dysprosium	65	Tb
Ho	66	Dy	Ho	66	Dy
Erbium	67	Ho	Erbium	67	Ho
Thulium	68	Er	Thulium	68	Er
Ytterbium	69	Tm	Ytterbium	69	Tm
Lutetium	70	Yb	Lutetium	70	Yb
Hafnium	71	Hf	Hafnium	71	Hf
Tantalum	72	Ta	Tantalum	72	Ta
Tungsten	73	W	Tungsten	73	W
Rhenium	74	Re	Rhenium	74	Re
Osmium	75	Os	Osmium	75	Os
Iridium	76	Ir	Iridium	76	Ir
Rhodium	77	Pt	Rhodium	77	Pt
Palladium	78	Au	Palladium	78	Au
Silver	79	Hg	Silver	79	Hg
Cadmium	80	Tl	Cadmium	80	Tl
Indium	81	Pb	Indium	81	Pb
Tin	82	Bi	Tin	82	Bi
Antimony	83	Po	Antimony	83	Po
Tellurium	84	At	Tellurium	84	At
Iodine	85	Rn	Iodine	85	Rn
Xenon	86		Xenon	86	
Cesium	87		Cesium	87	
Barium	88		Barium	88	
Lanthanum	89-102		Lanthanide series	89-102	
Actinide series	*		Actinide series	*	
Francium	87	Fr	Francium	87	Fr
Radium	88	Ra	Radium	88	Ra
Actinium	89	Ac	Actinium	89	Ac

• Lanthanide series
 • Actinide series

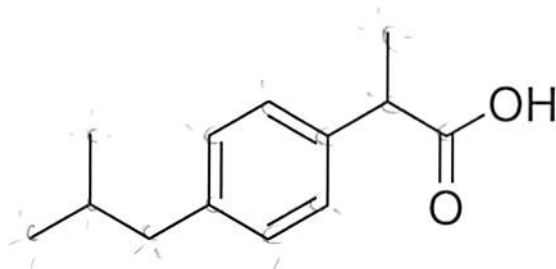
Lanthanum	57	La	Cerium	58	Ce	Praseodymium	59	Pr	Neodymium	60	Nd	Europium	61	Pm	Samarium	62	Sm	Europium	63	Eu	Gadolinium	64	Gd	Terbium	65	Tb	Dysprosium	66	Dy	Ho	67	Ho	Erbium	68	Er	Thulium	69	Tm	Ytterbium	70	Yb
138.91			140.12			140.91			144.24			151.96			150.36			151.96			157.25			158.93			162.50			164.93			167.26			168.93			173.04		
89			90			91			92			93			94			95			96			97			98			99			100			101			102		
8271			729.64			271.04			273.03			1271			1241			1241			1241			1241			1251			1251			1251			1268			1268		

Name My Mixtape is called "Your G.P.A" - It's gonna drop soon!!

1-10 are True / False (10pts)

- 1) Enantiomers are non-superimposable mirror images. T
- 2) Single bonds are typically shorter and stronger than double bonds. False
- 3) S_N2 reactions generate 100% inversion of stereochemistry because the nucleophile must attack from directly behind the Carbon – Leaving Group bond. T
- 4) (R) or (S) stereocenters are assigned according to rules of the Cahn-Ingold-Prelog convention. T
- 5) An *elimination* is a reaction where two atoms or groups are removed to produce a new π bond. T
- 6) Hex-1-ene and Cyclohexane are stereoisomers. False
- 7) A diastereomer is a stereoisomer which is not an enantiomer. T
- 8) Saytzeff's rule states that the major product from an elimination will be the more highly alkyl substituted π bond. T
- 9) A Leaving Group must be a good Proton donor. False
- 10) Hydrogen Bromide and Peroxides is the reagent set used to add H and Cl, with Anti-Markovnikov regiochemistry, with Syn stereochemistry to alkenes. False

11) (5pts) Below is Ibuprofen, a nonsteroidal anti-inflammatory drug (NSAID) that is used for treating pain, fever, and inflammation. It is available under trade names, including Advil and Motrin. It is the #1 selling OTC pain reliever in the USA.

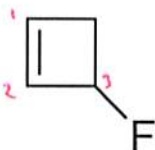


Determine:

- The number of Carbons. 13
- The number of Hydrogens. 18
- The number of π bonds. 4
- The number of chiral centers. 1
- Based on your answer to (d) – how many different stereoisomers fit the above (imprecise) structural representation?

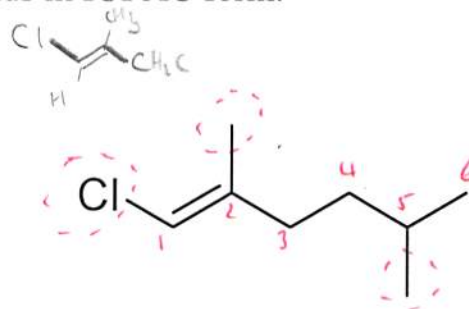
$$2^1 = 2.$$

12) (3+4=7pts) Name these two compounds in IUPAC form.



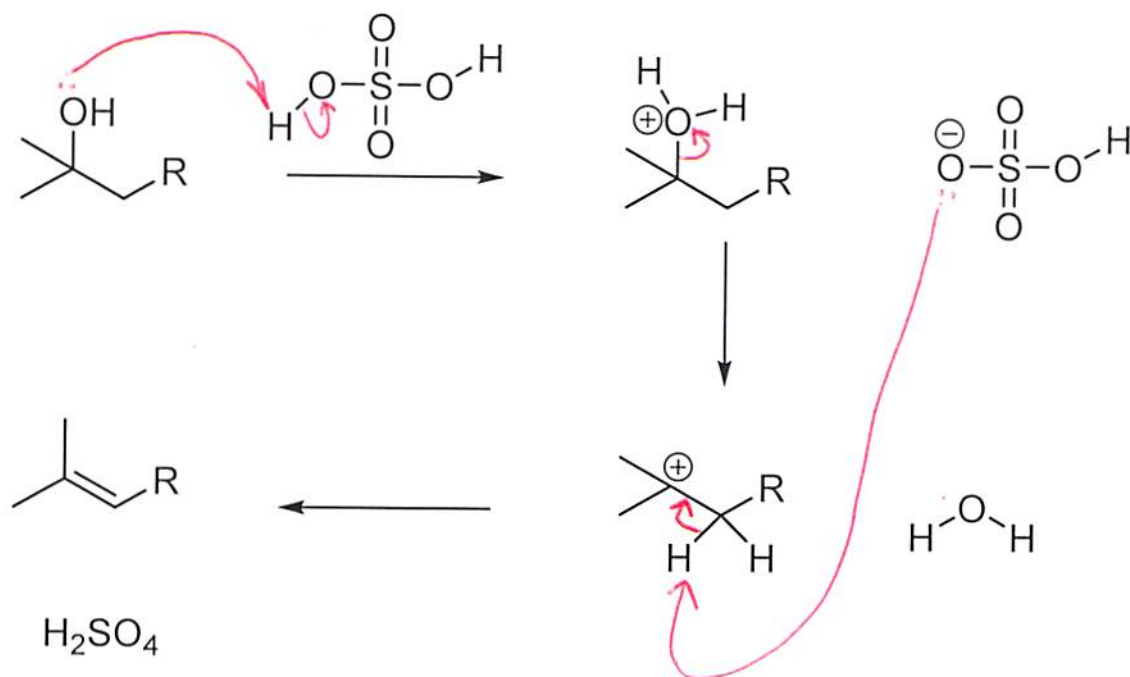
3-FLUORO CYCLOBUTENE

(3-Fluorocyclobut-1-ene
is acceptable)

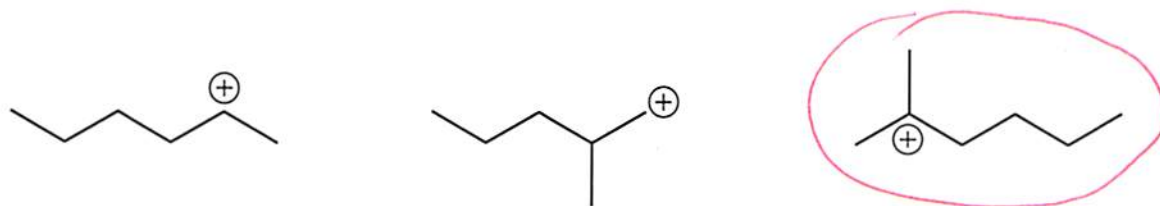


E-1-CHLORO-2,5-DIMETHYLHEX-1-ENE

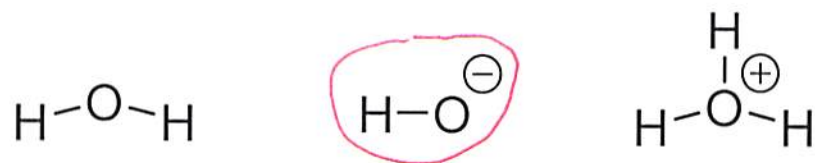
13) (4pts) Draw in the curly arrows for this acid catalyzed elimination.



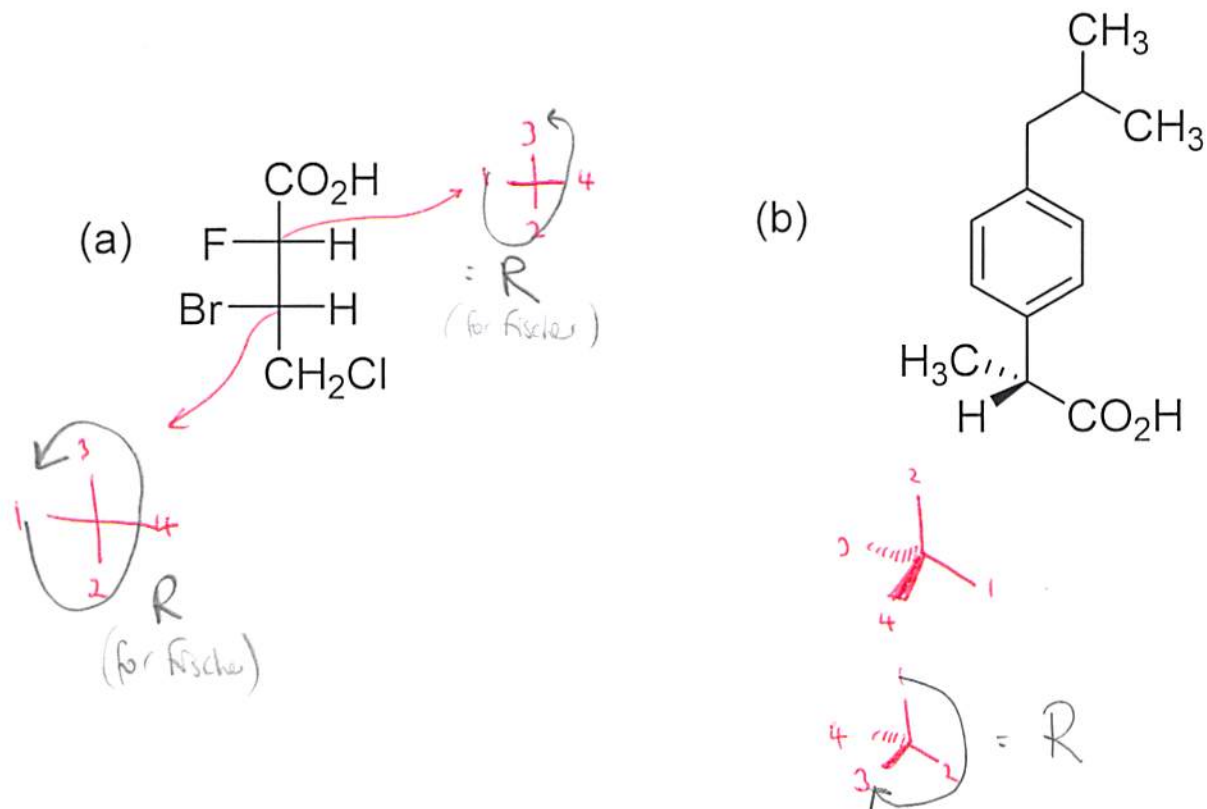
14) (1pt) Circle the most stable cation in this trio.



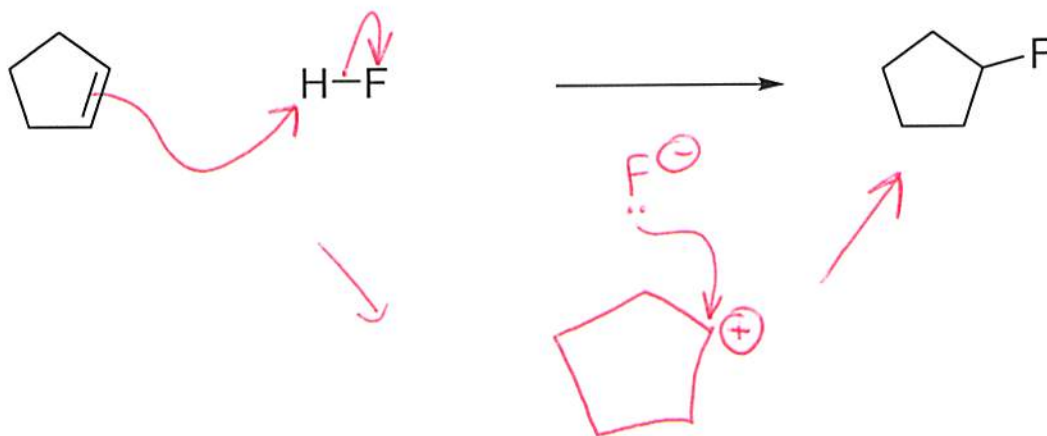
15) (1pt) Circle the species in this trio that is the better nucleophile.



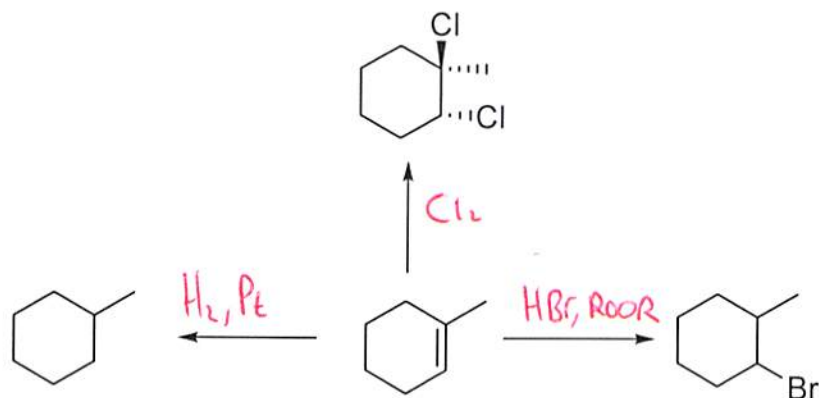
16) (6pts) Assign (R) or (S) to every chiral center in the following molecules.



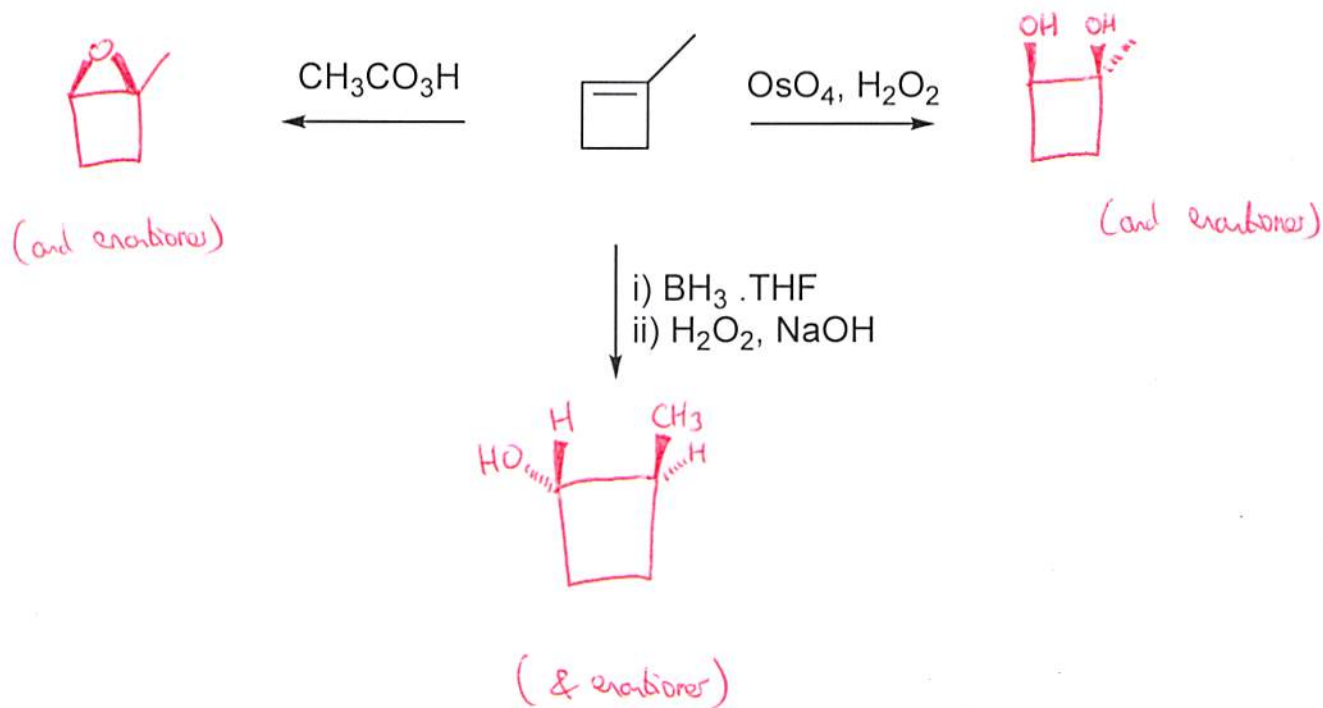
17) (4pts) Draw the mechanism (i.e. using curly arrows) for this electrophilic addition of hydrogen fluoride to cyclopentene.



18) Give the **reagents** for the following reactions. (6pts)



19) (6pts) Give the products formed in the following transformations of the below cyclic alkene, *paying attention to stereo- and regio-chemistry where relevant.*



****Up to TWO BONUS POINTS****

Provide the opposite of the following chemical terms.

Inversion (of stereochemistry)

Retention

Saytzeff (product)

Hofmann