Name _____

1. What is the IUPAC name of the following compound?



- 2-methyl-4-hexanamine
 5-methyl-3-hexanamine
- 2) 2-methyl-4-aminohexane
 4) 5-methyl-3-aminohexane
- 2. To convert a nitrile to a primary amine you must:
 - 1) hydrolyze it with water.
 - 2) oxidize it with chromic acid.
 - 3) reduce it with hydrogen or lithium aluminum hydride.
 - 4) substitute it with an alkyl halide.
- 3. Which one of the following synthetic routes gives the best yield of meta-bromoaniline starting with benzene?

1) benzene	Br ₂	HNO ₃	(1) Sn, HCl	-			
	FeBr ₃	H ₂ SO ₄	(2) NaOH	-			
2) benzene	HNO_3 H_2SO_4	(1) Sn, HC (2) NaOH	$\frac{Br_2}{FeBr_3}$	>			
3) benzene	$\frac{\text{HNO}_3}{\text{H}_2\text{SO}_4}$	Br ₂ FeBr ₃	(1) Sn, HCl (2) NaOH				
4) benzene	(1) Sn, HCl (2) NaOH	HNO_3 H_2SO_4	FeBr ₃	Þ			
1) 1		2) 2		3)	3	4)	4

- 4. Which one of the following forms a diazonium ion on being treated with NaNO₂ in aqueous HCl?
 - para-nitrotoluene
 N,N-dimethylaniline
 triethylamine

Name __

5. What is the product of the following reaction?



- 1) 3,5-dimethyl-4-nitrophenol
- 2) 1,3-dimethyl-5-nitrobenzene
- 3) meta-xylene (meta-dimethybenzene)
- 4) 3,5-dimethylphenol





- 1) $(CH_3)_2CHCH_2CH_2NHNH_2$ 2) $(CH_3)_2CHCH_2CH_2NH_2$
- 3) $[(CH_3)_2CHCH_2CH_2]_2NH$ 4) $(CH_3)_2CHCH_2CH_2CONH_2$
- 7. Which one of the following is ethyl 4-(dimethylamino)butanoate?

2) $H_2NCH_2CCH_2CO_2CH_2CH_3$ H_3 4) $(CH_3)_2NCH_2CH_2CO_2CH_2CH_3$ CH_3 4) $(CH_3)_2NCH_2CH_2CO_2CH_2CH_3$

1) 1 2) 2 3) 3 4) 4

8. Rank the following three compounds in order of decreasing basicity.





9. Which of the following reagents can convert cyclohexanone to *N*-ethylcyclohexylamine as shown below?



- 1) $CH_3CH_2NH_2$ and H_2/Pt
- 2) LiAlH₄ followed by H_2O and then CH_3CH_2Br
- 3) CH₃CH₂Br and NH₃
- 4) $CH_3CH=0$ and NH_3
- 10. Which of the following would be the starting reagents needed to make the azo compound shown below?





11. What is the product of the reaction series shown below?



12. Rank the following three compounds in decreasing order of basicity.



1) C>A>B 2) C>B>A 3) B>A>C 4) B>C>A

13. In the following two-phase reaction, the catalyst works by:

 $C_6H_5CH_2Br + KCN \xrightarrow{C_6H_5CH_2N(CH_3)_3 Cl} C_6H_5CH_2CN + KBr$

- 1) transferring $\rm CN^-$ from the aqueous phase to the organic phase containing $\rm C_{6}H_{2}Br.$
- 2) transferring $C_{6}H_{5}CH_{2}Br$ from the organic phase to the aqueous phase containing CN⁻.
- 3) removing Br^- from the organic phase to the aqueous phase.
- removing K⁺ from the organic phase to make cyanide ion more nucleophilic.