3. (10 pts) A disaccharide, $C_{12}H_{22}O_{11}$, exists in α and β forms which undergo mutarotation. It is hydrolyzed by enzymes known to cleave β linkages to give only D-(+)-glucose. Reaction of the disaccharide with Br_2 in H_2O, followed by reaction with excess dimethyl sulfate and base gives an octa-O-methyl derivative **A**. Hydrolysis of **A** gives 2,3,4,6-tetra-O-methyl-D-glucose and 2,4,5,6-tetra-O-methyl-D-gluconic acid (the methylated mono-carboxylic acid of glucose). Draw the structure of <u>both</u> the disaccharide and **A**.

4. (15 pts) Explain (S&S) why electrophilic attack on furan gives more 2-substituted than 3-substituted product.

furan