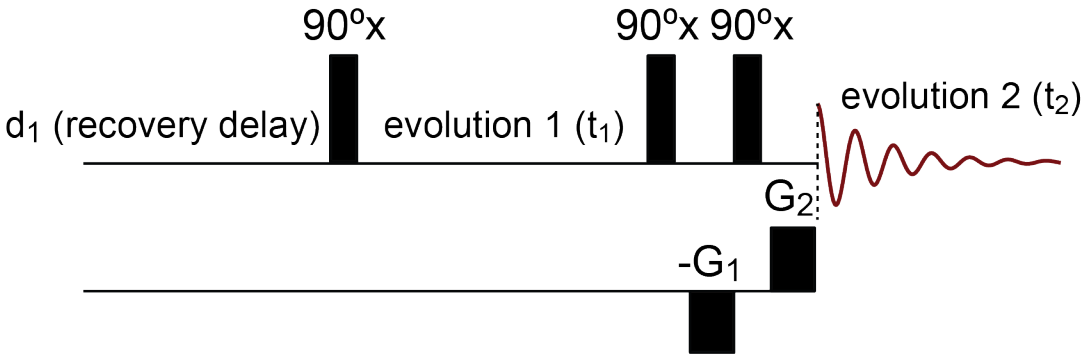
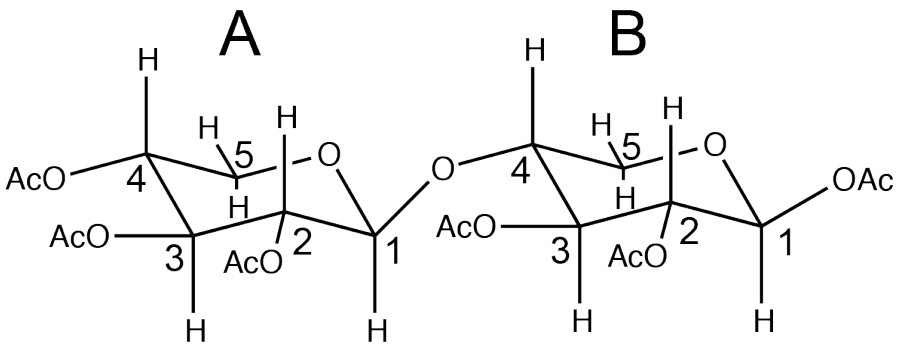
PROBLEM SET 5, BCMB/CHEM 8190

1) The following is a pulse sequence for a gradient enhanced *double*-quantum filtered (DQF) homonuclear COSY. What should the relative values of the gradients G1 and G2 be? You should consider what product operator terms are present just before the first gradient pulse is applied, and at what frequencies these precess.

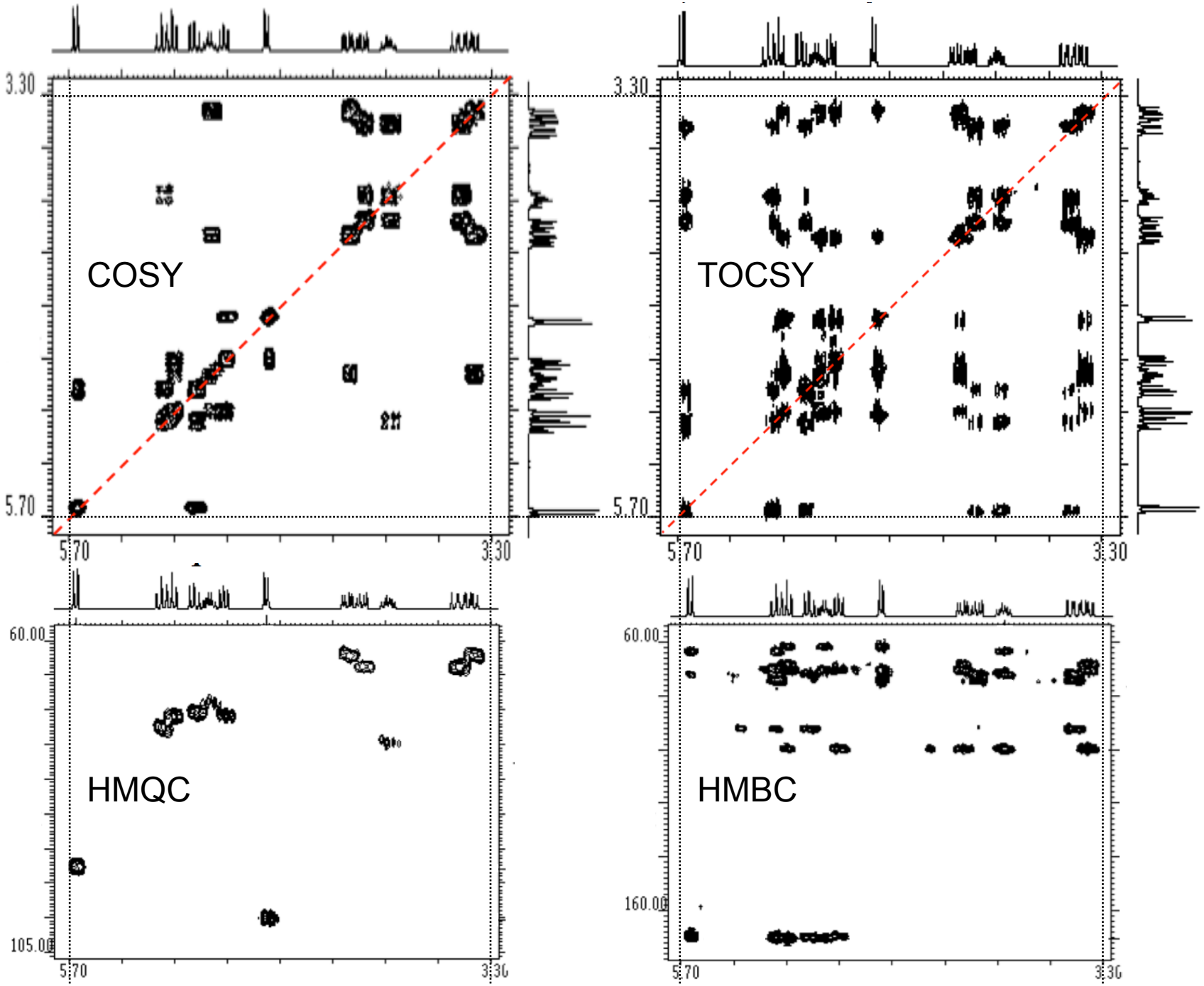


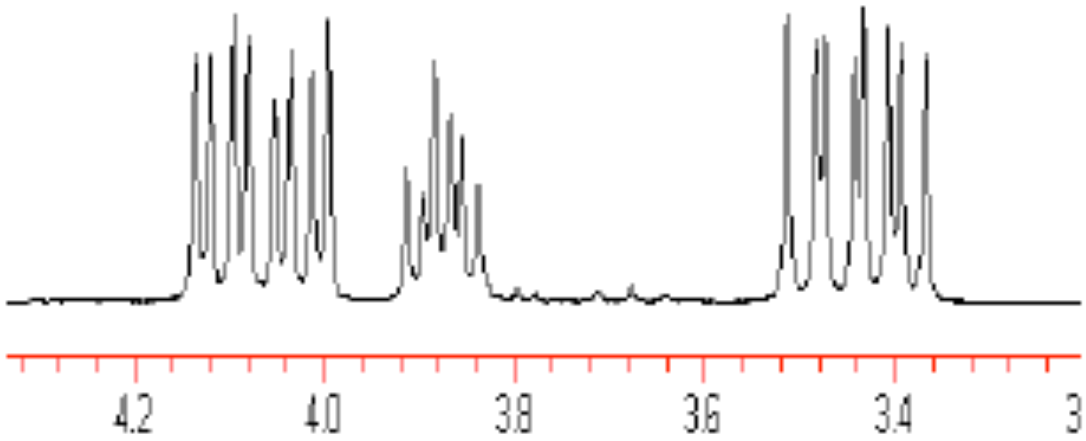
2) The structure of an acetylated derivative of xylobiose is shown:



^{1}H COSY and TOCSY spectra and ^{1}H, ^{13}C-HMQC and HMBC spectra are shown on the following page (page 2). An expansion of the 1D, ^{1}H NMR spectrum from ~ 3 to 4.3 ppm is also shown (page 3). The horizontal and vertical dotted lines on the 2D spectra at 5.7 and 3.3 ppm are drawn to show that the scales of the ^{1}H chemical shift axes of all experiments are the same. The scales of the ^{13}C chemical shift axes of the HMQC and HMBC experiments are not the same. Signals from the -CH_3 groups of the acetyl groups do NOT appear in the regions of the spectra shown. From the spectra, assign the ^{1}H and ^{13}C chemical shifts for positions 1-5. You also should be able to assign the ^{13}C chemical shifts of the carbonyl carbons of the acetyl groups.

	A ring						B ring					
	1	2	3	4	5 ax	5 eq	1	2	3	4	5 ax	5 eq
^{13}C												
^{1}H												


COSY
TOCSY
HMQC
HMBC
3.30
5.70
60.00
105.00
160.00


4.2
4.0
3.8
3.6
3.4
3