

## GY 402 Sedimentary Petrology (2009)

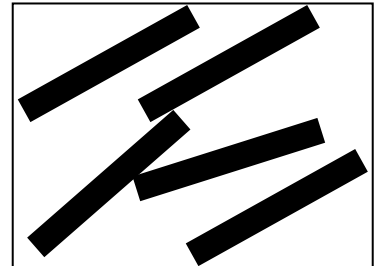
### Paleocurrent Lab Assignment

#### Bonus Opportunity

**Introduction:** This bonus lab will give you an opportunity to apply some graphical methods of analysis to sedimentology data. You have been provided with 3 data sets and are asked to plot these data on the attached rose diagrams. Each data set also has one or more associated questions. To get full credit for this lab, you must successfully do all of the questions, but partial credit will be given if you only complete part of the lab.

#### Problem Set One

A most astute paleontologist (Dr Murlene Clark) chanced upon a large bedding plane outcrop of fine grained litharenite that contained abundant carbonaceous wood fragments (sticks and twigs). They were clearly orientated (imbricated; see sketch) which Dr Clark immediately realized meant that they were current emplaced. She measured the long axis of each wood fragment which is presented in the table below.



010	015	007	010	186	016	190	187	008	192
008	355	012	178	180	188	006	015	356	176
192	359	018	358	193	197	352	181	009	

Plot up the data in rose diagram fashion. Can you decide the mean current direction from this data or only a trend (e.g., toward the NW or the SW etc.)? Why? Work out the arithmetic mean. Is this useful? Now work out the geometric mean using the formula on the rose diagram.

#### Problem Set Two

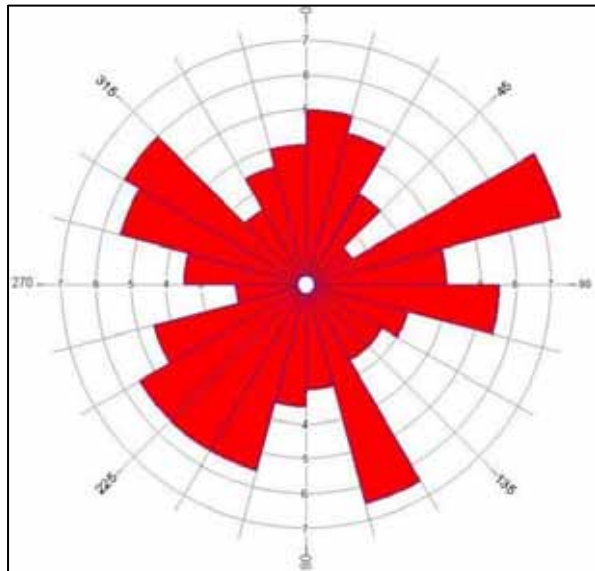
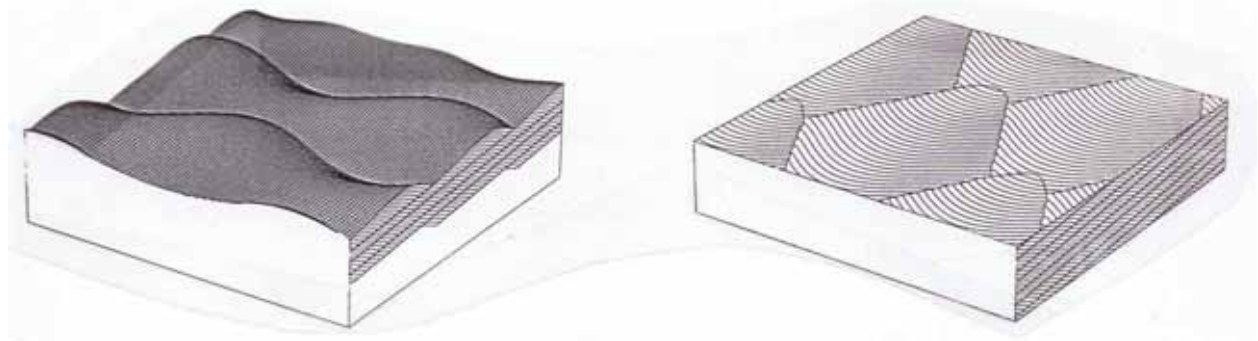
Meanwhile, a well dressed but very thirsty hydrogeologist (Dr. Jim Connors) was looking for a source of groundwater to quench his dry throat. He thought he might be successful near a rather nice outcrop of mega-rippled quartz arenite (he should have looked behind before proceeding to the rocks; he passed 2 water fountains, a bottled water kiosk and a pretty big (and hard to miss!) brew-pub). Once at the outcrop, he decided to measure as main current orientations as possible. They are in the table below (dip in degrees/dip direction in degrees). Plot the data on a separate rose diagram. Suggest a reason for the pattern.

15/268	13/272	15/093	7/105	12/086	19/009	12/281	6/103	8/272	6/284
15/265	7/084	10/270	8/094	16/095	10/082	7/095	6/193	12/087	9/086
6/092	7/100	10/281	7/270	11/272	12/275	15/275	6/274	10/268	12/268

**Problem Set Three**

Dr. David Allison did not miss the brew pub. While sipping on a fine vintage of ale from the south coast of Ireland, he noticed that the one wall of the pub was cut into bedrock (the same quartz arenite that Connors died of thirst on), but that here, the dominant bedform was through cross-stratification. He pulled out his trust Brunton and began to measure the strike of the troughs in the direction of their concavity (ask for help from Dr. Haywick with this one... I'm sitting by Dr Allison drinking my own pint of bitter). The data recorded is summarized below. Plot these on another rose diagram. What is the significance of the pattern given that the directions were measured from 2 distinct horizons in the outcrop?

071	068	028	030	072	067	032	035	067	100	063	068
027	035	026	065	064	082	090	070	088	072	025	024
038	072	030	031	080	100	012	042	016	006	018	058



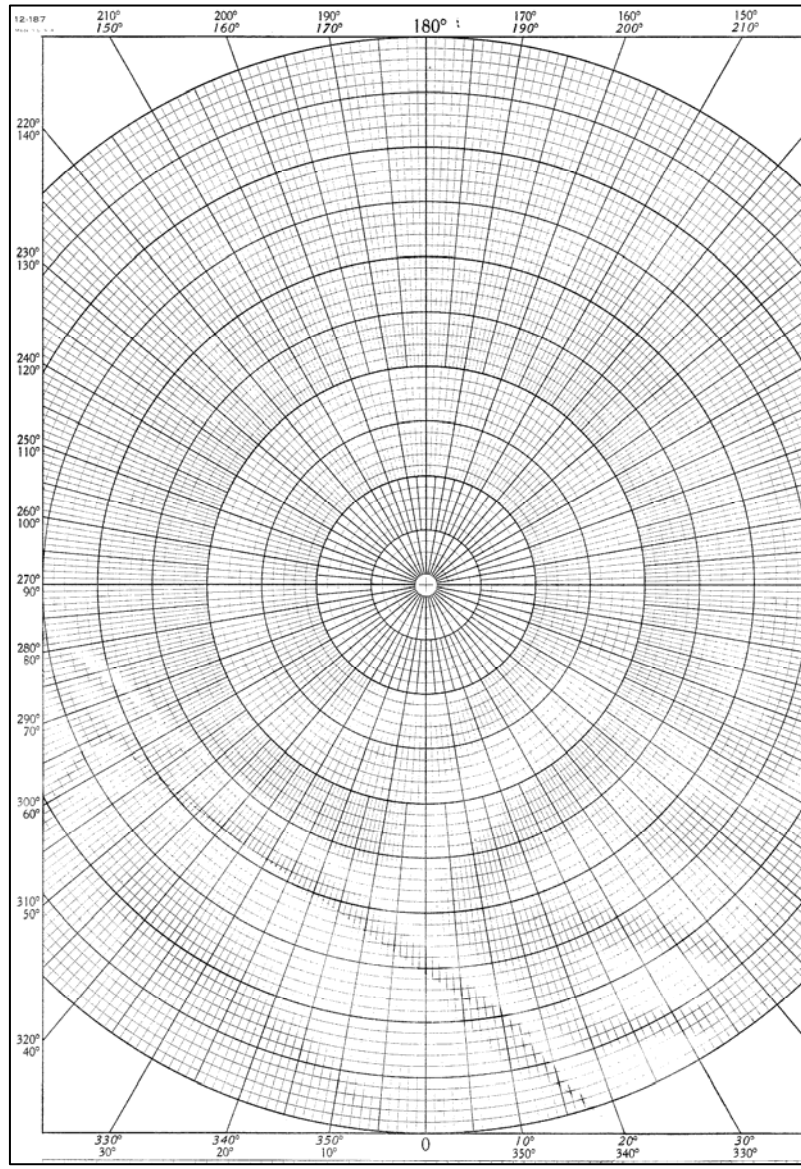
An example of a rose diagram produced by a program in the Rockware software suite

### Problem 1 Rose diagram

$$X_g = \tan^{-1} \left[ \frac{\sum \sin X_i}{\sum \cos X_i} \right]$$

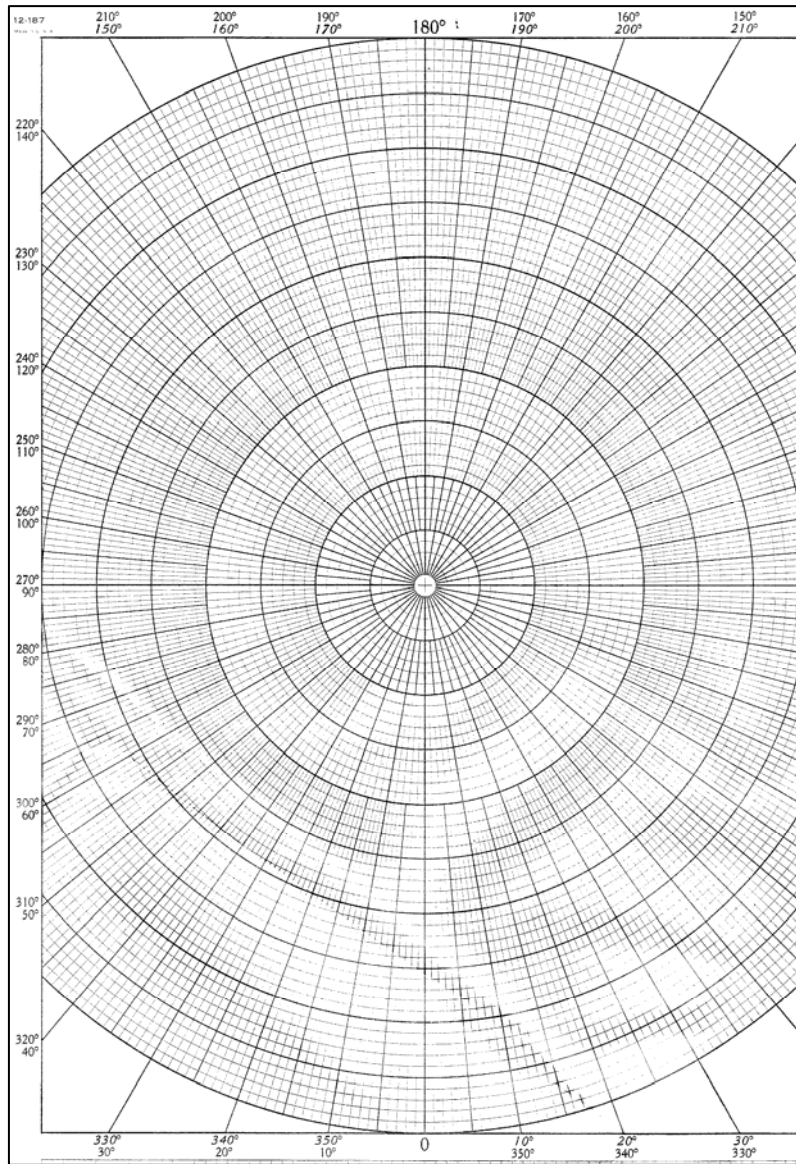
Arithmetic Mean: \_\_\_\_\_

Geometric Mean: \_\_\_\_\_  
(use adjacent formula)



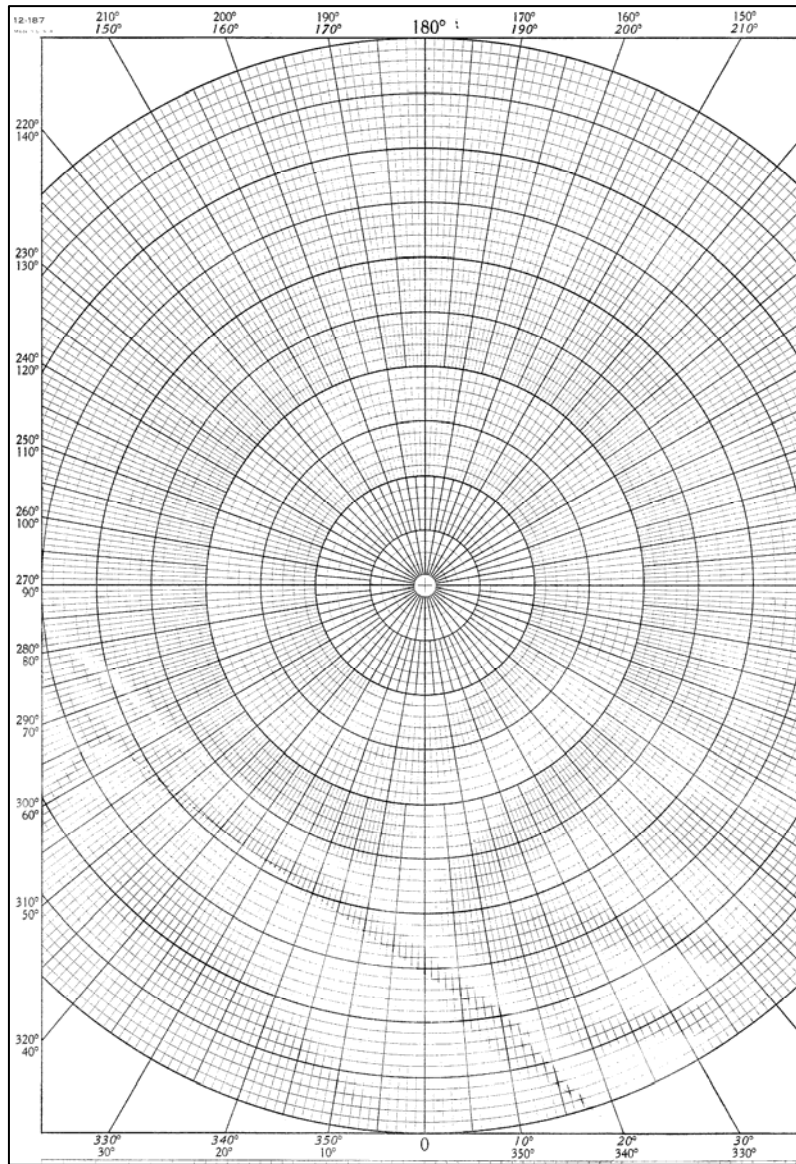
**Answers for other questions:**

### Problem 2 Rose diagram



Answers for other questions:

### Problem 3 Rose diagram



Answers for other questions: