1. Consider that you have a number of polymer chains, with the following distribution: 15 chains of degree of polymerization 10, 35 chains of degree of polymerization 100, 90 chains of degree of polymerization 500, 98 chains of degree of polymerization 1000, 50 chains of degree of polymerization 5000, 5 chains of degree of polymerization 50000.

a) calculate the average number and weight average molecular weights ($M_n$ and $M_w$) assuming that the monomeric molecular weight is 1.0.

b) add 5 more chains of degree of polymerization 10 to the above distribution. Comment on the effect this has on $M_n$ and $M_w$.

c) instead of 5 more chains of degree of polymerization 10 add 5 more chains of degree of polymerization 50000 to the initial distribution. Comment on the relative effect on $M_n$ and $M_w$ between (b) and (c).

d) if xxx is the monomeric molecular weight, where xxx are the last 3 digits of your social security number (pls. write the xxx number down on your answer paper!) what would be the $M_n$ and $M_w$ for the initial distribution? [15 points]

2. What is the functionality * of each of the following reactions? What type (linear, branched, etc) of polymer will be formed in each case?

a) CH₂CH₂OH + CH₃COOH —>  
b) HOCH₂CH₂OH + CH₃COOH —>  
c) HOCH₂CH₂OH + HOOCCH₂COOH —>  
d) HOCH₂COOH —>  
e) HOCH₂C(OH)HCH₂OH + HOOCCH₂COOH —>  
f) HOCH₂C(OH)HCH₂OH + CH(COOH)₃ —>  
g) HOCH₂C(OH)HCH₂OH + CH₃COOH —>  
h) HOOC(CH₂)₆NH₂ —>  
i) HOOC(CH₂)₆COOH —>  

[10 points]

*Hint: you must somehow define the term: “functionality of reaction”