This problem is adapted from H. S. Fogler, *Elements of Chemical Reaction Engineering*, Third Edition. The following pulse data were collected for a flow reactor.

time(min)	0	1	2	3	4	5	6	7	8	9	10	12	14
C(mg/liter)	0	1	5	8	10	8	6	4	3	2.2	1.5	0.6	0

This reactor will be used for a first-order, liquid phase, isothermal reaction

$$\mathrm{A} \longrightarrow \mathrm{B} \tag{1}$$

$$r = k \times c_A$$

where k=0.25 min^{-1}

1. Determine the distribution function, mean residence time and variance for these data.

2. Determine the effluent concentration of A using the CSTRs-in-Series model when the inlet concentration of A is $c_{Af} = 0.02$ gmoles/cm^3.

3. Determine the effluent concentration of A using the integrated form of the segregated flow model when the inlet concentration of A is $c_{Af} = 0.02$ gmoles/cm^3.

4. Determine the effluent concentration of A using the differential form of the segregated flow model when the inlet concentration of A is $c_{Af} = 0.02$ gmoles/cm^3.

5. Determine the effluent concentration of A using the maximum mixedness flow model when the inlet concentration of A is $c_{Af} = 0.02$ gmoles/cm^3.