AFCoKaRE Practice Problem 11.5

Purpose: This problem allows you to practice calculating the age function and using the result to test the ideality of a stirred tank reactor.

Problem Statement: In order to test the ideality of a 0.65 gal stirred tank reactor, a steady 1 gal min^{-1} flow of water was established in it. 25 g of a tracer were then dumped into the tank, and the mass concentration of tracer in the reactor effluent was measured as a function of time. The resulting data are listed in the table below and in the Excel file prob_11_5_data.xlsx. Based on the age function of the stirred tank reactor, can it be modeled as a perfectly mixed CSTR?

Time (min)	*Tracer Conc. (g/gal)*
0	37.63
0.03	36.34
0.06	33.46
0.1	33.99
0.13	31.65
0.19	28.62
0.25	24.68
0.31	23.17
0.38	20.37
0.44	18.55
0.5	16.58
0.56	14.61
0.63	13.25
0.69	12.42
0.75	10.07

Time (min)	*Tracer Conc. (g/gal)*
0.81	10.75
0.88	9.24
0.94	8.93
1	7.87
1.06	7.27
1.13	5.15
1.19	4.92
1.25	4.77
1.31	4.69
1.38	5.07
1.44	3.56
1.5	4.39
1.56	3.48
1.63	3.71
1.69	2.65

Time (min)	*Tracer Conc. (g/gal)*
1.75	1.82
1.81	0.98
1.88	1.97
1.94	2.35
2	1.29
2.06	0.98
2.13	1.06
2.19	0.3
2.25	0.68
2.31	0.83
2.38	0.91
2.41	0.76
2.44	1.21
2.47	0.83
2.5	2.04