# NUEN 301
# Homework 4

Donald Doyle UIN: 128005953

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Tables and plots for question 1.

| Case | 1 |
|---|---|
| initial value n(0) | 1 |
| initial values c(0) | 108.33333333333333 |
| root s1 | 0.02966895304744267 |
| root s2 | -29.875123498501985 |
| Neutron population particular solution | 0 |
| Amplitude A1 | 1.0978062799210755 |
| Amplitude A2 | -0.09780627992107559 |
| Amplitude B1 | 4008.5342232313 |
| Amplitude B2 | 0.3546656577106529 |
| Value of prompt jump | 1.0999999999999999 |
| n(5 sec) | 1.2733594736887408 |
| n(30 sec) | 2.6734839953914658 |

| Case number | 2 |
|---|---|
| n(0) | 1 |
| c(0) | 108.33333333333333 |
| rooot s1 | 0.0 |
| rooot s2 | -32.8 |
| Neutron population particular solution | 0 |
| Amplitude A1 | 1.0 |
| Amplitude A2 | -0.0 |
| Amplitude B1 | inf |
| Amplitude B2 | 0.0 |
| Value of prompt jump | 1.0 |

| Case number | 3 |
|---|---|
| n(0) | 1 |
| c(0) | 108.33333333333333 |
| rooot s1 | -0.029777174614441324 |
| rooot s2 | -36.38133393649667 |
| Neutron population particular solution | 0 |
| Amplitude A1 | 0.9014805896771907 |
| Amplitude A2 | 0.09851941032280931 |
| Amplitude B1 | -3279.706637031496 |
| Amplitude B2 | -0.29336296840940107 |
| Value of prompt jump | 0.9 |
| n(5 sec) | 0.7767764798014428 |
| n(30 sec) | 0.36897292701955076 |

| Case number | 4 |
|---|---|
| n(0) | 0.5538461538461539 |
| c(0) | 108.33333333333333 |
| rooot s1 | 0.02966895304744267 |
| rooot s2 | -29.875123498501985 |
| Neutron population particular solution | -0.6769230769230771 |
| Amplitude A1 | 1.0978062799210755 |
| Amplitude A2 | -0.09780627992107559 |
| Amplitude B1 | 4008.5342232313 |
| Amplitude B2 | 0.3546656577106529 |
| Value of prompt jump | 1.222222222222222 |
| n(5 sec) | 0.5964363967656637 |
| n(30 sec) | 1.9965609184683886 |

| Case number | 5 |
|---|---|
| n(0) | 0.5538461538461539 |
| c(0) | 108.33333333333333 |
| rooot s1 | 0.0 |
| rooot s2 | -32.8 |
| Neutron population particular solution | -0.018633540372670804 t |
| Amplitude A1 | 1.0 |
| Amplitude A2 | -0.0 |
| Amplitude B1 | inf |
| Amplitude B2 | 0.0 |
| Value of prompt jump | 1.1111111111111112 |
| n(5 sec) | 0.906832298136646 |
| n(30 sec) | 0.44099378881987583 |

| Case number | 6 |
|---|---|
| n(0) | 0.5538461538461539 |
| c(0) | 108.33333333333333 |
| rooot s1 | -0.07461192373943437 |
| rooot s2 | -43.55872140959389 |
| Neutron population particular solution | 0.18461538461538463 |
| Amplitude A1 | 0.7525826897043073 |
| Amplitude A2 | 0.247417310295692 53 |
| Amplitude B1 | -1092.7179906171302 |
| Amplitude B2 | -0.6153427162532942 |
| Value of prompt jump | 0.8333333333333334 |
| n(5 sec) | 0.7028620197446885 |
| n(30 sec) | 0.2648658984612321 |
| n(500 sec) | 0.18461538461538468 |

| Case number | 7 |
|---|---|
| n(0) | 0.5538461538461539 |
| c(0) | 108.33333333333333 |
| rooot s1 | -0.015659679017251613 |
| rooot s2 | -34.58989587653831 |
| Neutron population particular solution | 1.1076923076923078 |
| Amplitude A1 | 0.9482303566646283 |
| Amplitude A2 | 0.0517696433353717 |
| Amplitude B1 | -6559.8378607995055 |
| Amplitude B2 | -0.16213919949388056 |
| Value of prompt jump | 1.0526315789473684 |
| n(5 sec) | 1.9845099786515805 |
| n(30 sec) | 1.7004626805851024 |
| n(500 sec) | 1.1080694087599139 |

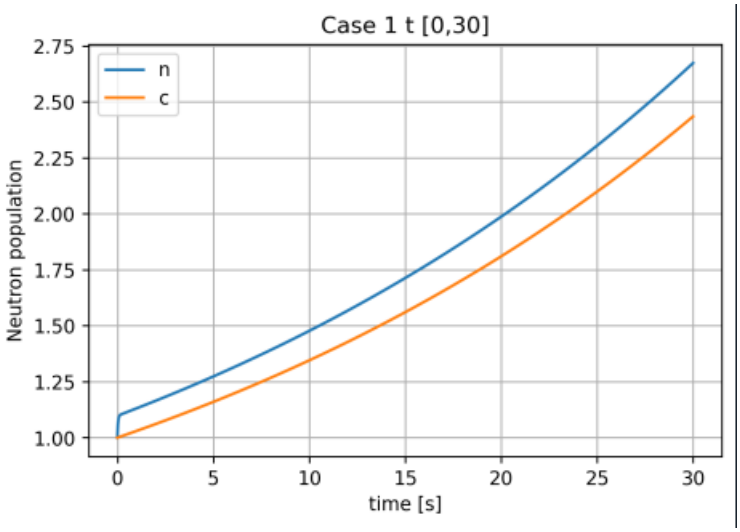


Figure 1: Case 1 for n(t) of [0,30]

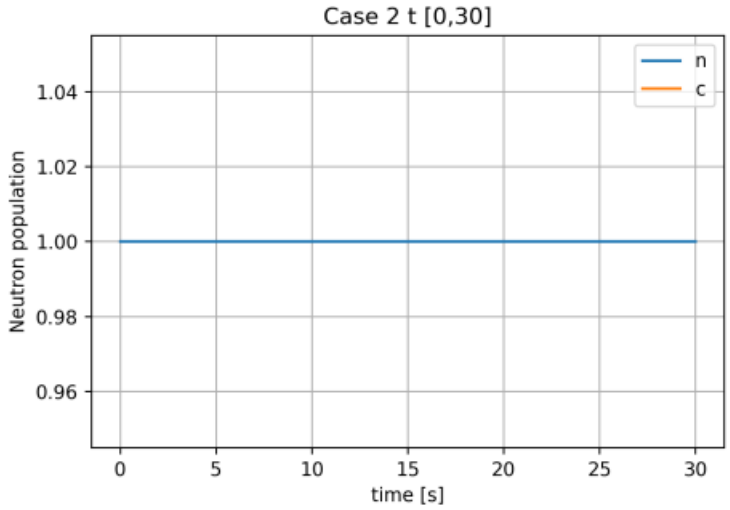


Figure 2: Case 2 for n(t) of [0,30]

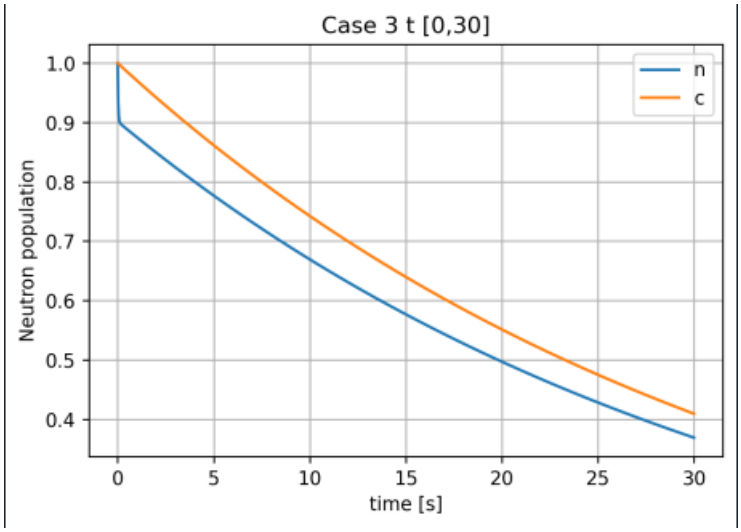


Figure 3: Case 3 for n(t) of [0,30]

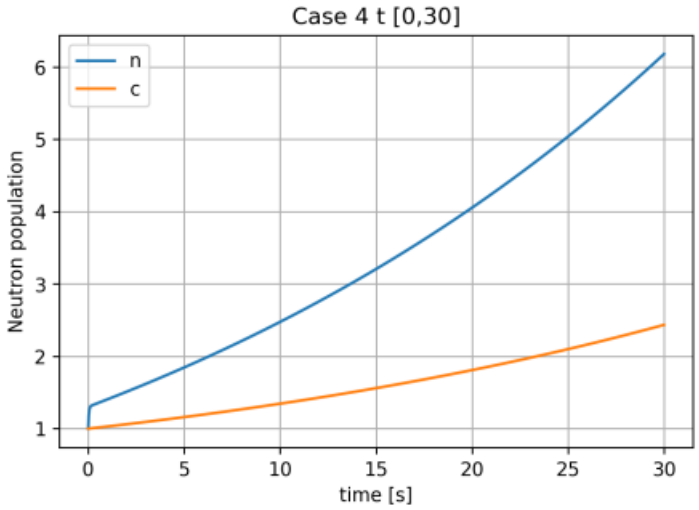


Figure 4: Case 4 for n(t) of [0,30]

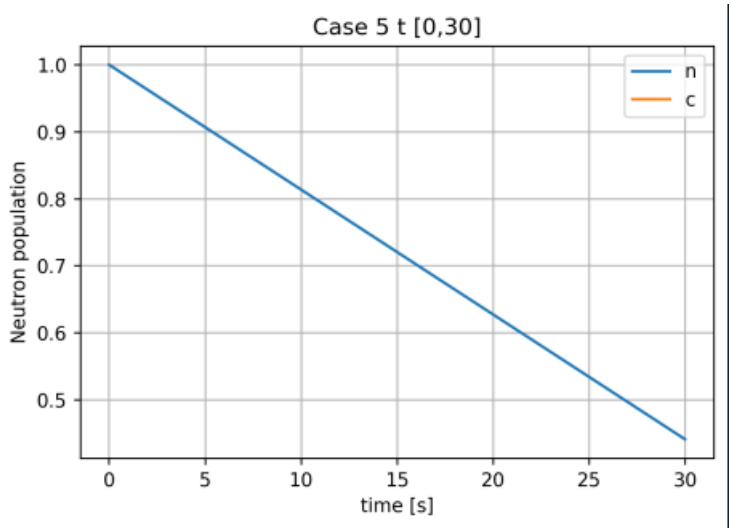


Figure 5: Case 5 for n(t) of [0,30]

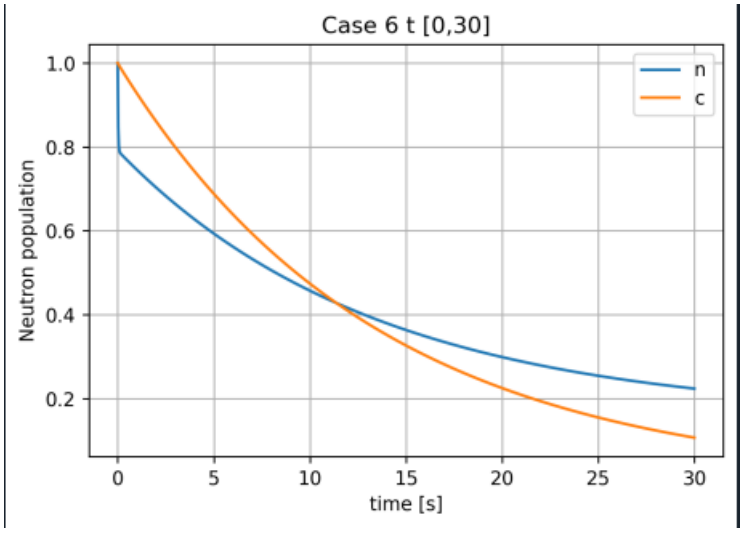


Figure 6: Case 6 for n(t) of [0,30]

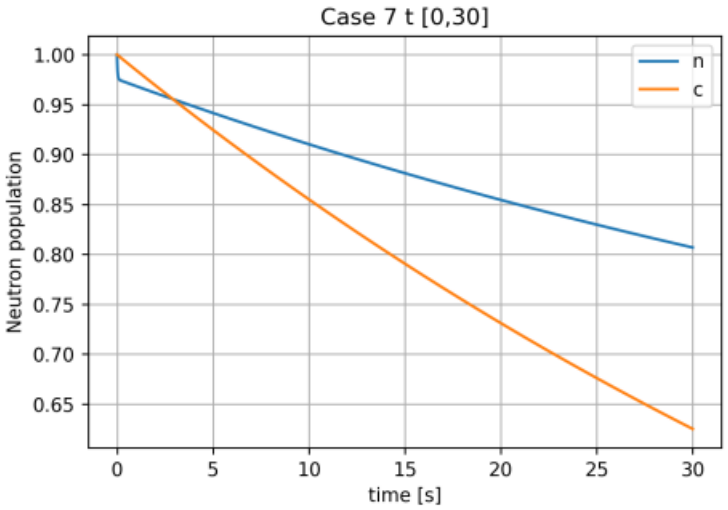


Figure 7: Case 7 for n(t) of [0,30]

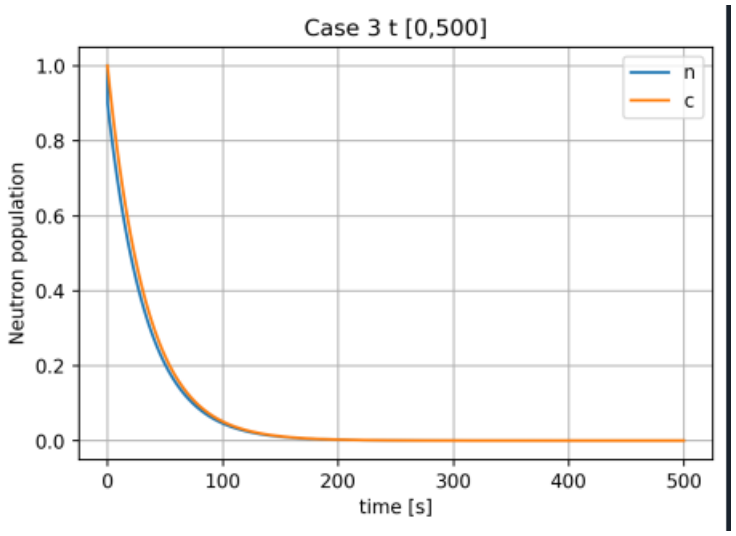


Figure 8: Case 3 for n(t) of [0,500]

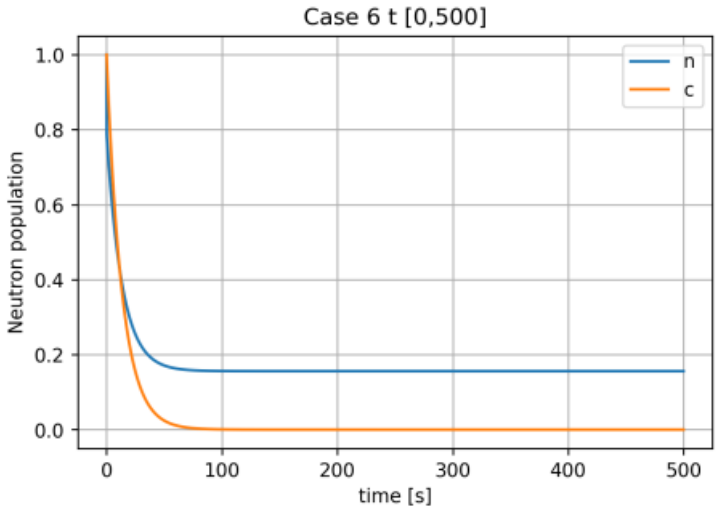


Figure 9: Case 6 for n(t) of [0,500]

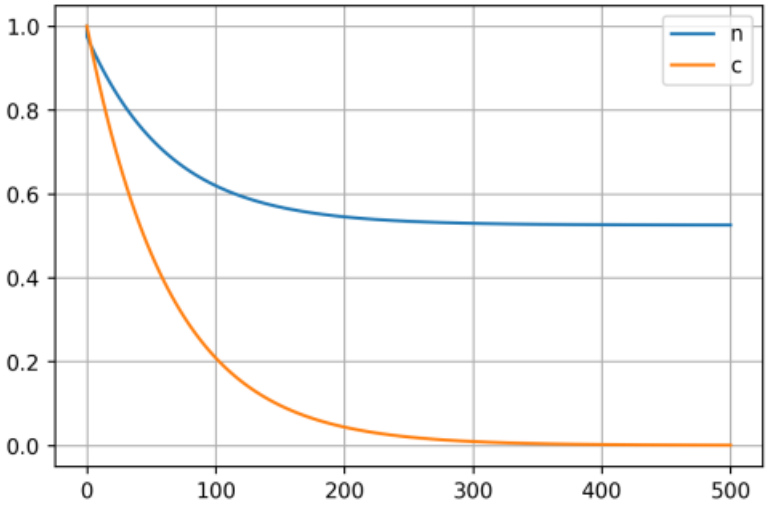


Figure 10: Case 7 for n(t) of [0,500]

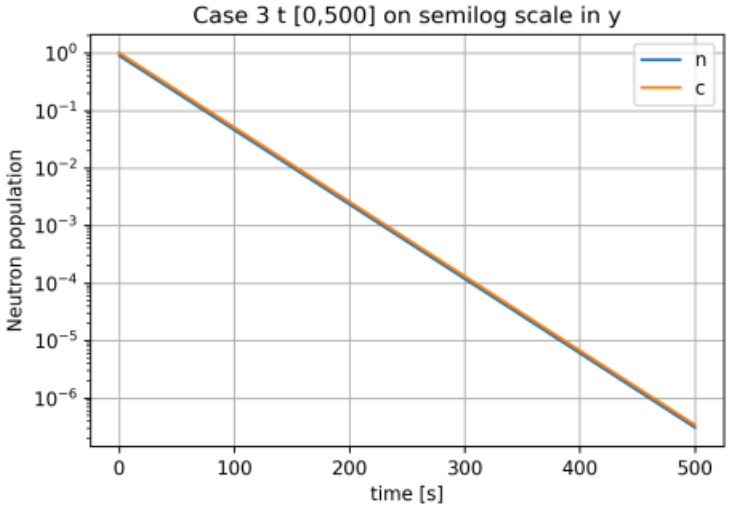


Figure 11: Case 3 for n(t) of [0,500] with semilog scale Y axis

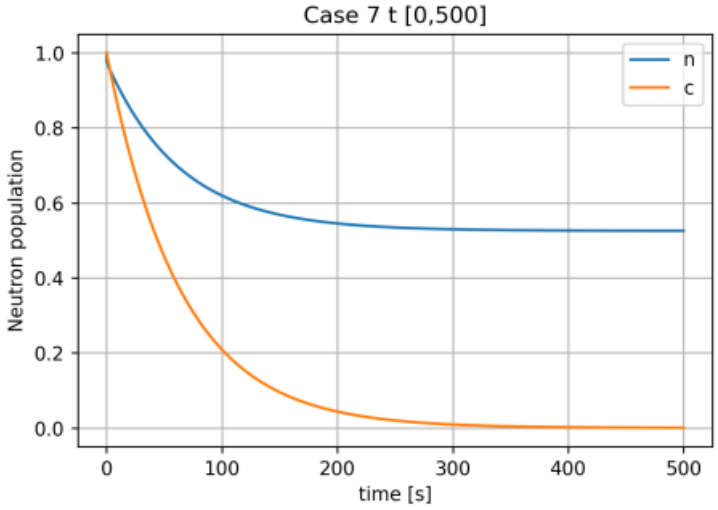


Figure 12: Case 6 for n(t) of [0,500] with semilog scale Y axis

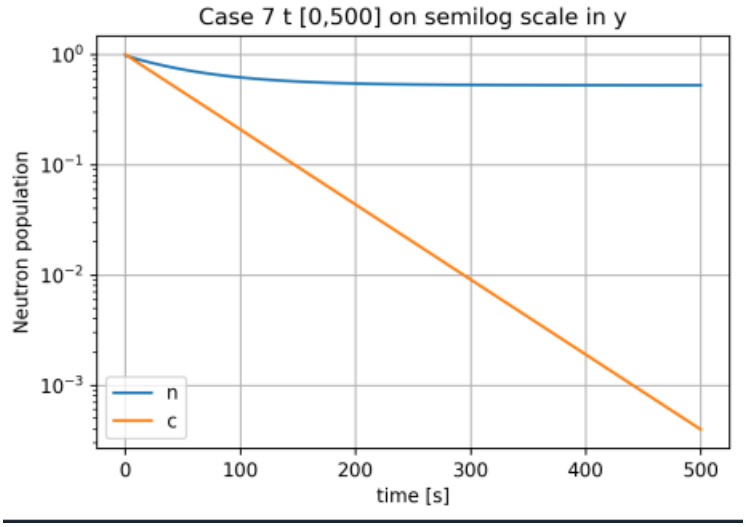


Figure 13: Case 7 for n(t) of [0,500] with semilog scale Y axis

Plots for question 2.

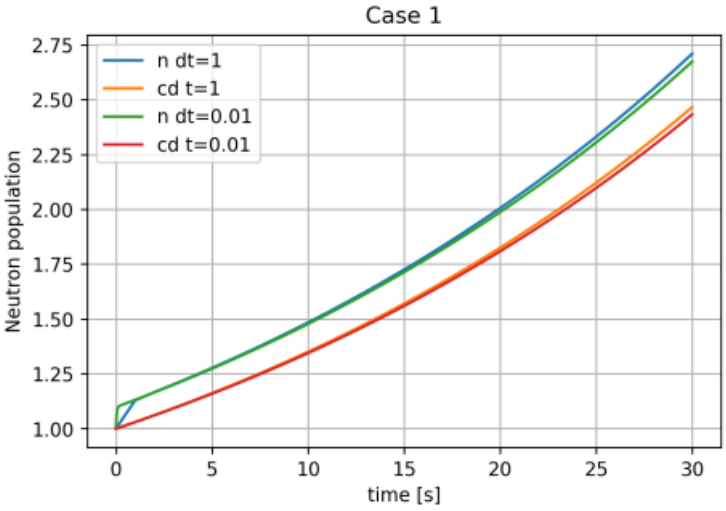


Figure 14: Case 1 numerical solution

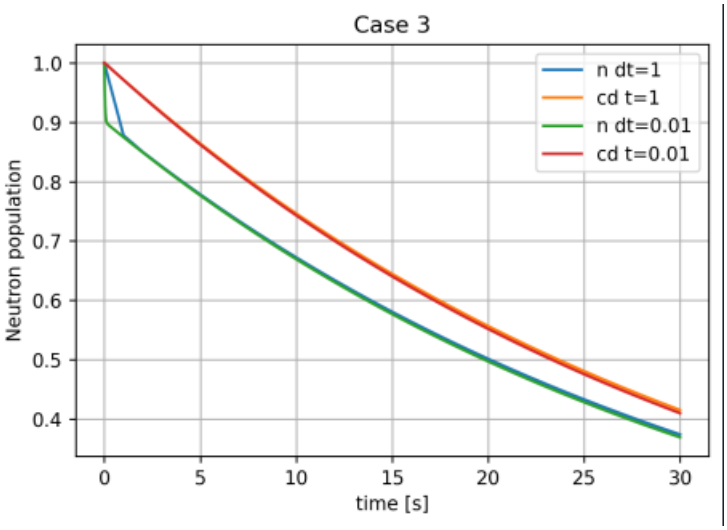


Figure 15: Case 3 numerical solution

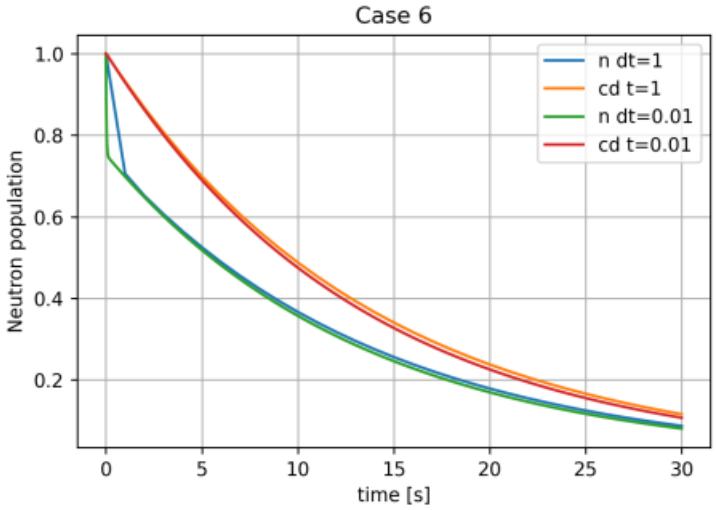


Figure 16: Case 6 numerical solution

Question 3:

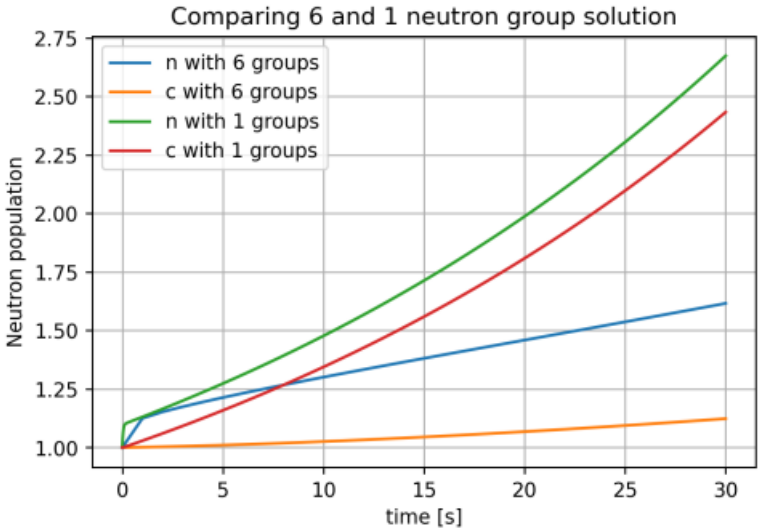


Figure 17: Case 1 comparing numerical solutions with 1 and 6 neutron groups