

# Soc 756 Problem Set 4

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## Building the Lifetable

```
1 library(readxl)
2 setwd("D:/Wisconsin/25-26-F Soc 756 Dem Tech II/Soc 756 ps 4")
3
4 data <- read_excel("ps4_Fall2025_data.xls", skip = 4, col_names = FALSE)
5 colnames(data) <- c("age", "pNS", "pSN", "pND", "pSD")
6
7 l10 <- 1740000
8 n_ages <- nrow(data)
9
10 lx <- numeric(n_ages)
11 lxN <- numeric(n_ages)
12 lxS <- numeric(n_ages)
13 dNS <- numeric(n_ages)
14 dND <- numeric(n_ages)
15 dSN <- numeric(n_ages)
16 dSD <- numeric(n_ages)
17 Lx <- numeric(n_ages)
18 LxN <- numeric(n_ages)
19 LxS <- numeric(n_ages)
20
21 lx[1] <- l10
22 lxN[1] <- l10 * 0.98
23 lxS[1] <- l10 * 0.02
24
25 for (i in 1:(n_ages - 1)) {
26   dNS[i] <- lxN[i] * data$pNS[i]
27   dND[i] <- lxN[i] * data$pND[i]
28   dSN[i] <- lxS[i] * data$pSN[i]
29   dSD[i] <- lxS[i] * data$pSD[i]
```

```

30
31   lxN[i + 1] <- lxN[i] - dNS[i] - dND[i] + dSN[i]
32   lxS[i + 1] <- lxS[i] + dNS[i] - dSN[i] - dSD[i]
33   lx[i + 1] <- lxN[i + 1] + lxS[i + 1]
34
35   LxN[i] <- (lxN[i] + lxN[i + 1]) / 2
36   LxS[i] <- (lxS[i] + lxS[i + 1]) / 2
37   Lx[i] <- LxN[i] + LxS[i]
38 }
39
40 life_table <- data.frame(
41   age = data$age,
42   lx = lx,
43   lxN = lxN,
44   lxS = lxS,
45   dNS = dNS,
46   dND = dND,
47   dSN = dSN,
48   dSD = dSD,
49   Lx = Lx,
50   LxN = LxN,
51   LxS = LxS
52 )
53
54 print(life_table)
55
56 # Output
57 print(xtable(life_table, caption = "Increment-Decrement Life Table"),
58       file = "lt.tex", include.rownames = FALSE)

```

# 1

$$p \approx 0.655287895 \times 100\% \approx 65.53\%$$

```

1 #=====
2 #===== 1
3
4 total_ever_smoked <- lxS[1] + sum(dNS)
5 p_ever_smoked <- total_ever_smoked / 110
6
7 print(p_ever_smoked)

```

## 2

a Expected years as smoker: 14.48

b Expected years as non-smoker: 24.3

c Expected years alive: 38.78

```
1 #=====
2 #===== 2
3
4 tx_smoker <- sum(LxS, na.rm = TRUE)
5 tx_nonsmoker <- sum(LxN, na.rm = TRUE)
6 tx <- sum(Lx, na.rm = TRUE)
7
8 ex_smoker <- tx_smoker / 110
9 ex_nonsmoker <- tx_nonsmoker / 110
10 ex <- tx / 110
11
12 cat("Expected years as smoker:", round(ex_smoker, 2), "\n")
13 cat("Expected years as non-smoker:", round(ex_nonsmoker, 2), "\n")
14 cat("Expected years alive:", round(ex, 2), "\n\n")
```

## 3

Average age of smokers: 32.47. Average age of non-smokers: 28.02 – younger.

```
1 #=====
2 #===== 3
3
4 avg_age_smoker <- sum((data$age + 0.5) * LxS) / sum(LxS)
5 avg_age_nonsmoker <- sum((data$age + 0.5) * LxN) / sum(LxN)
6
7 cat("Average age of smokers:", round(avg_age_smoker, 2), "\n")
8 cat("Average age of non-smokers:", round(avg_age_nonsmoker, 2), "\n")
```

## 4

See Figure 1. Seemed a bit inconsistent with results from Q3, which finds that non-smokers are younger on average. The probability of starting smoking is much higher at younger ages while the probability of quitting smoking is higher at older ages, meaning non-smoking group

are losing more young people and getting more old people. A bit inconsistent that they are on average the younger group when we only look at the transition probabilities.

```

1 #=====
2 #===== 4
3
4 library(ggplot2)
5
6 transition <- data.frame(
7   age = rep(data$age, 2),
8   probability = c(data$pNS, data$pSN),
9   type = c(rep("Starting smoking (N->S)", n_ages),
10            rep("Quitting smoking (S->N)", n_ages))
11 )
12
13 p <- ggplot(transition, aes(x = age, y = probability, color = type)) +
14   geom_line(linewidth = 1) +
15   labs(x = "Age", y = "Probability",
16        title = "Age-Specific Transition Probabilities",
17        color = "Transition") +
18   theme_minimal() +
19   theme(legend.position = "bottom")
20
21 print(p)
22
23 ggsave("transition_p.png", p, width = 8, height = 6)

```

## 5

No, because the non-smoking state can't differentiate people who never smoked versus people who quit smoking.

## 6

Smoking is likely to be addictive, meaning former smokers face higher risk of relapse compared to never-smokers. There are also peer effects and social externalities in smoking behavior that create heterogeneity across individuals. Some people might also just be more prone to smoking due to different biological predispositions or social backgrounds.

With better data one could possibly add a third state within in the non-smoking group for former smokers (or quitters, repenters, call it as you may). One could also allow  $p^{NS}$  and

$p^{SN}$  or maybe even  $p^{ND}$  and  $p^{SD}$  to vary across different subgroups or by smoking duration and time since quitting.

## 7

See Table 2 and 3 for the lifetable of smoking and non-smoking at age 10. See Figure 2 for the graph. Please check out the file on Canvas for the graph with color because I cannot afford color printing.

```

1 #=====
2 #===== 7
3
4 # Function to calculate life table
5 calc_lifetable <- function(N, S) {
6   lx <- numeric(n_ages)
7   lxN <- numeric(n_ages)
8   lxS <- numeric(n_ages)
9   dNS <- numeric(n_ages)
10  dND <- numeric(n_ages)
11  dSN <- numeric(n_ages)
12  dSD <- numeric(n_ages)
13  Lx <- numeric(n_ages)
14  LxN <- numeric(n_ages)
15  LxS <- numeric(n_ages)
16
17  lx[1] <- N + S
18  lxN[1] <- N
19  lxS[1] <- S
20
21  for (i in 1:(n_ages - 1)) {
22    dNS[i] <- lxN[i] * data$pNS[i]
23    dND[i] <- lxN[i] * data$pND[i]
24    dSN[i] <- lxS[i] * data$pSN[i]
25    dSD[i] <- lxS[i] * data$pSD[i]
26
27    lxN[i + 1] <- lxN[i] - dNS[i] - dND[i] + dSN[i]
28    lxS[i + 1] <- lxS[i] + dNS[i] - dSN[i] - dSD[i]
29    lx[i + 1] <- lxN[i + 1] + lxS[i + 1]
30
31    LxN[i] <- (lxN[i] + lxN[i + 1]) / 2
32    LxS[i] <- (lxS[i] + lxS[i + 1]) / 2
33    Lx[i] <- LxN[i] + LxS[i]
34  }

```

```

35
36 life_table_df <- data.frame(
37   age = data$age,
38   lx = lx,
39   lxN = lxN,
40   lxS = lxS,
41   dNS = dNS,
42   dND = dND,
43   dSN = dSN,
44   dSD = dSD,
45   Lx = Lx,
46   LxN = LxN,
47   LxS = LxS
48 )
49
50 return(list(LxN = LxN, LxS = LxS, radix = lx[1], table = life_table_df))
51 }
52
53 # Life table: Non-smokers at age 10
54 lt_nonsmoker <- calc_lifetable(N = 100, S = 0)
55 ex_N_nonsmoker <- sum(lt_nonsmoker$LxN) / lt_nonsmoker$radix
56 ex_S_nonsmoker <- sum(lt_nonsmoker$LxS) / lt_nonsmoker$radix
57
58 # Output
59 print(xtable(lt_nonsmoker$table, caption = "Life Table: Non-smokers at Age
60             10"),
61       file = "lt_nonsmoker.tex", include.rownames = FALSE)
62
63 # Life table: Smokers at age 10
64 lt_smoker <- calc_lifetable(N = 0, S = 100)
65 ex_N_smoker <- sum(lt_smoker$LxN) / lt_smoker$radix
66 ex_S_smoker <- sum(lt_smoker$LxS) / lt_smoker$radix
67
68 # Output
69 print(xtable(lt_smoker$table, caption = "Life Table: Smokers at Age 10"),
70       file = "lt_smoker.tex", include.rownames = FALSE)
71
72 # Graph
73 plot_data <- data.frame(
74   status_at_10 = rep(c("Non-smoker at age 10", "Smoker at age 10"), each =
75     2),
76   state = rep(c("Non-smoker", "Smoker"), 2),
77   years = c(ex_N_nonsmoker, ex_S_nonsmoker,

```

```

76         ex_N_smoker, ex_S_smoker)
77 )
78
79 p <- ggplot(plot_data, aes(x = status_at_10, y = years, fill = state)) +
80   geom_bar(stat = "identity", position = "dodge") +
81   labs(x = "Smoking Status at Age 10",
82        y = "Expected Years",
83        title = "Expected Duration in Each State by Smoking Status at Age
84              10",
85        fill = "State") +
86   theme_minimal() +
87   theme(legend.position = "bottom")
88 print(p)
89
90 ggsave("ex_N_S.png", p, width = 8, height = 6)

```

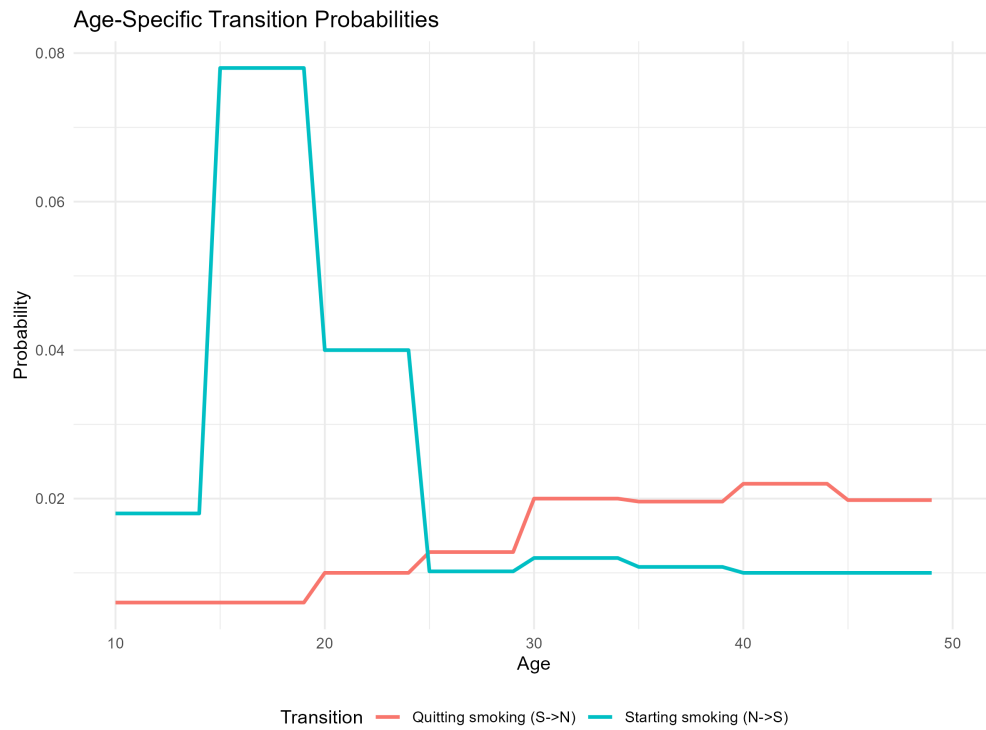


Figure 1: Transition probabilities by age

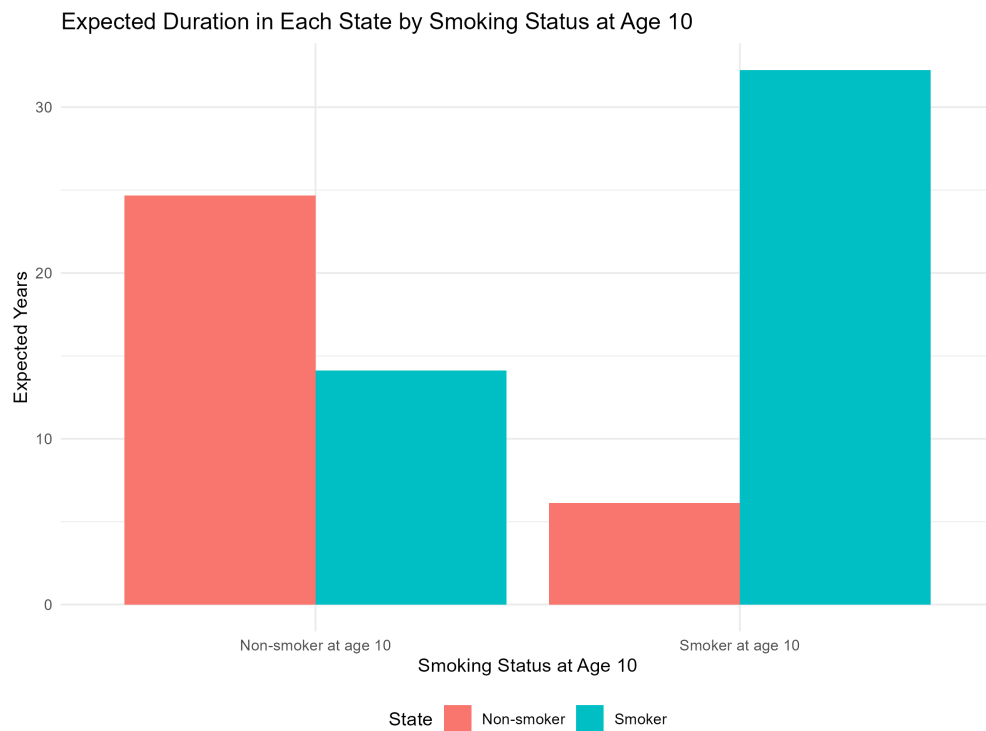


Figure 2: Expected duration in each state by the smoking status at 10



Table 1: Increment-Decrement Life Table

| age   | lx         | lxN        | lxS       | dNS       | dND     | dSN      | dSD      | Lx         | LxN        | LxS       |
|-------|------------|------------|-----------|-----------|---------|----------|----------|------------|------------|-----------|
| 10.00 | 1740000.00 | 1705200.00 | 34800.00  | 30693.60  | 619.81  | 208.80   | 12.65    | 1739683.77 | 1689647.70 | 50036.08  |
| 11.00 | 1739367.54 | 1674095.39 | 65272.15  | 30133.72  | 587.22  | 391.63   | 22.90    | 1739062.49 | 1658930.74 | 80131.75  |
| 12.00 | 1738757.43 | 1643766.09 | 94991.34  | 29587.79  | 629.96  | 569.95   | 36.40    | 1738424.25 | 1628942.19 | 109482.06 |
| 13.00 | 1738091.07 | 1614118.29 | 123972.78 | 29054.13  | 737.73  | 743.84   | 56.66    | 1737693.87 | 1599594.28 | 138099.59 |
| 14.00 | 1737296.67 | 1585070.26 | 152226.41 | 28531.26  | 898.67  | 913.36   | 86.31    | 1736804.18 | 1570811.97 | 165992.21 |
| 15.00 | 1736311.69 | 1556553.69 | 179758.01 | 121411.19 | 1082.85 | 1078.55  | 125.05   | 1735707.74 | 1495845.94 | 239861.80 |
| 16.00 | 1735103.79 | 1435138.20 | 299965.59 | 111940.78 | 1241.51 | 1799.79  | 259.49   | 1734353.29 | 1379446.95 | 354906.34 |
| 17.00 | 1733602.79 | 1323755.70 | 409847.09 | 103252.94 | 1356.12 | 2459.08  | 419.87   | 1732714.79 | 1272680.71 | 460034.08 |
| 18.00 | 1731826.80 | 1221605.72 | 510221.08 | 95285.25  | 1340.11 | 3061.33  | 559.72   | 1730876.88 | 1174823.70 | 556053.18 |
| 19.00 | 1729926.97 | 1128041.69 | 601885.28 | 87987.25  | 1243.62 | 3611.31  | 663.55   | 1728973.38 | 1085231.91 | 643741.48 |
| 20.00 | 1728019.79 | 1042422.13 | 685597.67 | 41696.89  | 784.73  | 6855.98  | 1474.61  | 1726890.12 | 1024609.31 | 702280.82 |
| 21.00 | 1725760.45 | 1006796.49 | 718963.97 | 40271.86  | 748.03  | 7189.64  | 1526.22  | 1724623.33 | 989881.36  | 734741.97 |
| 22.00 | 1723486.21 | 972966.24  | 750519.97 | 38918.65  | 742.60  | 7505.20  | 1636.64  | 1722296.58 | 956888.21  | 765408.37 |
| 23.00 | 1721106.96 | 940810.18  | 780296.77 | 37632.41  | 733.77  | 7802.97  | 1738.80  | 1719870.68 | 925528.58  | 794342.10 |
| 24.00 | 1718634.39 | 910246.98  | 808387.42 | 36409.88  | 704.82  | 8083.87  | 1788.41  | 1717387.78 | 895731.57  | 821656.21 |
| 25.00 | 1716141.17 | 881216.16  | 834925.01 | 8988.40   | 654.82  | 10687.04 | 1772.65  | 1714927.43 | 881738.06  | 833189.37 |
| 26.00 | 1713713.69 | 882259.97  | 831453.73 | 8999.05   | 613.07  | 10642.61 | 1650.77  | 1712581.77 | 882775.21  | 829806.57 |
| 27.00 | 1711449.85 | 883290.45  | 828159.40 | 9009.56   | 584.36  | 10600.44 | 1565.39  | 1710374.98 | 883793.71  | 826581.27 |
| 28.00 | 1709300.11 | 884296.97  | 825003.14 | 9019.83   | 595.14  | 10560.04 | 1586.38  | 1708209.35 | 884769.50  | 823439.84 |
| 29.00 | 1707118.59 | 885242.04  | 821876.55 | 9029.47   | 628.53  | 10520.02 | 1667.26  | 1705970.69 | 885673.05  | 820297.64 |
| 30.00 | 1704822.80 | 886104.06  | 818718.74 | 10633.25  | 689.69  | 16374.37 | 2731.02  | 1703112.44 | 888629.78  | 814482.66 |
| 31.00 | 1701402.08 | 891155.50  | 810246.59 | 10693.87  | 751.45  | 16204.93 | 2928.12  | 1699562.30 | 893535.31  | 806026.99 |
| 32.00 | 1697722.51 | 895915.11  | 801807.40 | 10750.98  | 817.25  | 16036.15 | 3134.60  | 1695746.59 | 898149.07  | 797597.52 |
| 33.00 | 1693770.66 | 900383.03  | 793387.63 | 10804.60  | 862.47  | 15867.75 | 3257.06  | 1691710.89 | 902483.37  | 789227.52 |
| 34.00 | 1689651.13 | 904583.71  | 785067.41 | 10855.00  | 920.47  | 15701.35 | 3423.66  | 1687479.06 | 906546.65  | 780932.41 |
| 35.00 | 1685306.99 | 908509.59  | 776797.41 | 9811.90   | 965.95  | 15225.23 | 3539.61  | 1683054.21 | 910733.27  | 772320.94 |
| 36.00 | 1680801.44 | 912956.96  | 767844.47 | 9859.94   | 1019.67 | 15049.75 | 3675.40  | 1678453.90 | 915042.04  | 763411.86 |
| 37.00 | 1676106.36 | 917127.11  | 758979.25 | 9904.97   | 1105.00 | 14875.99 | 3919.11  | 1673594.31 | 919060.12  | 754534.19 |
| 38.00 | 1671082.25 | 920993.13  | 750089.12 | 9946.73   | 1236.34 | 14701.75 | 4315.36  | 1668306.40 | 922752.47  | 745553.93 |
| 39.00 | 1665530.55 | 924511.81  | 741018.74 | 9984.73   | 1401.14 | 14523.97 | 4813.07  | 1662423.44 | 926080.86  | 736342.58 |
| 40.00 | 1659316.34 | 927649.91  | 731666.43 | 9276.50   | 1577.36 | 16096.66 | 5331.92  | 1655861.70 | 930271.31  | 725590.39 |
| 41.00 | 1652407.06 | 932892.71  | 719514.35 | 9328.93   | 1790.41 | 15829.32 | 5918.12  | 1648552.79 | 935247.70  | 713305.10 |
| 42.00 | 1644698.53 | 937602.69  | 707095.84 | 9376.03   | 2054.33 | 15556.11 | 6639.76  | 1640351.48 | 939665.56  | 700685.92 |
| 43.00 | 1636004.44 | 941728.44  | 694276.00 | 9417.28   | 2255.18 | 15274.07 | 7125.44  | 1631314.13 | 943529.24  | 687784.89 |
| 44.00 | 1626623.82 | 945330.04  | 681293.78 | 9453.30   | 2507.76 | 14988.46 | 7745.68  | 1621497.10 | 946843.75  | 674653.36 |
| 45.00 | 1616370.39 | 948357.45  | 668012.94 | 9483.57   | 2835.80 | 13226.66 | 8560.75  | 1610672.11 | 948811.09  | 661861.02 |
| 46.00 | 1604973.83 | 949264.73  | 655709.10 | 9492.65   | 3147.34 | 12983.04 | 9317.32  | 1598741.50 | 949436.26  | 649305.25 |
| 47.00 | 1592509.17 | 949607.78  | 642901.39 | 9496.08   | 3510.53 | 12729.45 | 10185.81 | 1585661.00 | 949469.20  | 636191.80 |
| 48.00 | 1578812.83 | 949330.62  | 629482.21 | 9493.31   | 3958.59 | 12463.75 | 11249.42 | 1571208.82 | 948836.55  | 622372.28 |
| 49.00 | 1563604.82 | 948342.47  | 615262.35 | 9483.42   | 4377.09 | 12182.19 | 12170.36 | 1555331.09 | 947503.31  | 607827.78 |
| 50.00 | 1547057.37 | 946664.15  | 600393.21 | 0.00      | 0.00    | 0.00     | 0.00     | 0.00       | 0.00       | 0.00      |

Table 2: Life Table: Smokers at Age 10

| age   | lx     | lxN   | lxS    | dNS  | dND  | dSN  | dSD  | Lx    | LxN   | LxS   |
|-------|--------|-------|--------|------|------|------|------|-------|-------|-------|
| 10.00 | 100.00 | 0.00  | 100.00 | 0.00 | 0.00 | 0.60 | 0.04 | 99.98 | 0.30  | 99.68 |
| 11.00 | 99.96  | 0.60  | 99.36  | 0.01 | 0.00 | 0.60 | 0.03 | 99.95 | 0.89  | 99.05 |
| 12.00 | 99.93  | 1.19  | 98.74  | 0.02 | 0.00 | 0.59 | 0.04 | 99.91 | 1.47  | 98.44 |
| 13.00 | 99.89  | 1.76  | 98.13  | 0.03 | 0.00 | 0.59 | 0.04 | 99.87 | 2.03  | 97.83 |
| 14.00 | 99.84  | 2.31  | 97.53  | 0.04 | 0.00 | 0.59 | 0.06 | 99.82 | 2.58  | 97.23 |
| 15.00 | 99.79  | 2.85  | 96.93  | 0.22 | 0.00 | 0.58 | 0.07 | 99.75 | 3.03  | 96.72 |
| 16.00 | 99.72  | 3.21  | 96.51  | 0.25 | 0.00 | 0.58 | 0.08 | 99.68 | 3.37  | 96.30 |
| 17.00 | 99.63  | 3.54  | 96.10  | 0.28 | 0.00 | 0.58 | 0.10 | 99.58 | 3.69  | 95.90 |
| 18.00 | 99.53  | 3.83  | 95.70  | 0.30 | 0.00 | 0.57 | 0.10 | 99.48 | 3.97  | 95.51 |
| 19.00 | 99.42  | 4.11  | 95.32  | 0.32 | 0.00 | 0.57 | 0.11 | 99.37 | 4.23  | 95.14 |
| 20.00 | 99.31  | 4.35  | 94.96  | 0.17 | 0.00 | 0.95 | 0.20 | 99.21 | 4.74  | 94.47 |
| 21.00 | 99.10  | 5.12  | 93.98  | 0.20 | 0.00 | 0.94 | 0.20 | 99.00 | 5.49  | 93.51 |
| 22.00 | 98.90  | 5.86  | 93.05  | 0.23 | 0.00 | 0.93 | 0.20 | 98.80 | 6.20  | 92.60 |
| 23.00 | 98.69  | 6.55  | 92.15  | 0.26 | 0.01 | 0.92 | 0.21 | 98.59 | 6.87  | 91.71 |
| 24.00 | 98.48  | 7.20  | 91.28  | 0.29 | 0.01 | 0.91 | 0.20 | 98.38 | 7.51  | 90.87 |
| 25.00 | 98.28  | 7.82  | 90.45  | 0.08 | 0.01 | 1.16 | 0.19 | 98.18 | 8.36  | 89.82 |
| 26.00 | 98.08  | 8.89  | 89.18  | 0.09 | 0.01 | 1.14 | 0.18 | 97.99 | 9.42  | 88.57 |
| 27.00 | 97.89  | 9.94  | 87.96  | 0.10 | 0.01 | 1.13 | 0.17 | 97.81 | 10.45 | 87.36 |
| 28.00 | 97.72  | 10.96 | 86.77  | 0.11 | 0.01 | 1.11 | 0.17 | 97.63 | 11.45 | 86.18 |
| 29.00 | 97.55  | 11.95 | 85.60  | 0.12 | 0.01 | 1.10 | 0.17 | 97.46 | 12.43 | 85.03 |
| 30.00 | 97.37  | 12.91 | 84.45  | 0.15 | 0.01 | 1.69 | 0.28 | 97.22 | 13.67 | 83.54 |
| 31.00 | 97.07  | 14.44 | 82.64  | 0.17 | 0.01 | 1.65 | 0.30 | 96.92 | 15.17 | 81.75 |
| 32.00 | 96.76  | 15.90 | 80.86  | 0.19 | 0.01 | 1.62 | 0.32 | 96.60 | 16.61 | 79.99 |
| 33.00 | 96.43  | 17.32 | 79.12  | 0.21 | 0.02 | 1.58 | 0.32 | 96.26 | 17.99 | 78.27 |
| 34.00 | 96.09  | 18.67 | 77.42  | 0.22 | 0.02 | 1.55 | 0.34 | 95.91 | 19.33 | 76.59 |
| 35.00 | 95.73  | 19.98 | 75.75  | 0.22 | 0.02 | 1.48 | 0.35 | 95.55 | 20.60 | 74.95 |
| 36.00 | 95.37  | 21.23 | 74.14  | 0.23 | 0.02 | 1.45 | 0.35 | 95.18 | 21.83 | 73.35 |
| 37.00 | 94.99  | 22.43 | 72.56  | 0.24 | 0.03 | 1.42 | 0.37 | 94.79 | 23.00 | 71.78 |
| 38.00 | 94.59  | 23.58 | 71.01  | 0.25 | 0.03 | 1.39 | 0.41 | 94.37 | 24.13 | 70.23 |
| 39.00 | 94.15  | 24.69 | 69.46  | 0.27 | 0.04 | 1.36 | 0.45 | 93.90 | 25.21 | 68.69 |
| 40.00 | 93.66  | 25.74 | 67.92  | 0.26 | 0.04 | 1.49 | 0.49 | 93.39 | 26.34 | 67.05 |
| 41.00 | 93.12  | 26.94 | 66.18  | 0.27 | 0.05 | 1.46 | 0.54 | 92.82 | 27.50 | 65.32 |
| 42.00 | 92.52  | 28.07 | 64.45  | 0.28 | 0.06 | 1.42 | 0.61 | 92.19 | 28.61 | 63.58 |
| 43.00 | 91.86  | 29.15 | 62.71  | 0.29 | 0.07 | 1.38 | 0.64 | 91.50 | 29.66 | 61.84 |
| 44.00 | 91.14  | 30.16 | 60.98  | 0.30 | 0.08 | 1.34 | 0.69 | 90.76 | 30.64 | 60.11 |
| 45.00 | 90.37  | 31.12 | 59.25  | 0.31 | 0.09 | 1.17 | 0.76 | 89.94 | 31.51 | 58.43 |
| 46.00 | 89.52  | 31.89 | 57.62  | 0.32 | 0.11 | 1.14 | 0.82 | 89.06 | 32.25 | 56.80 |
| 47.00 | 88.59  | 32.61 | 55.98  | 0.33 | 0.12 | 1.11 | 0.89 | 88.09 | 32.94 | 55.15 |
| 48.00 | 87.59  | 33.27 | 54.31  | 0.33 | 0.14 | 1.08 | 0.97 | 87.03 | 33.57 | 53.46 |
| 49.00 | 86.48  | 33.88 | 52.60  | 0.34 | 0.16 | 1.04 | 1.04 | 85.88 | 34.15 | 51.73 |
| 50.00 | 85.28  | 34.42 | 50.86  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00  | 0.00  | 0.00  |

Table 3: Life Table: Non-Smokers at Age 10

| age   | lx     | lxN    | lxS   | dNS  | dND  | dSN  | dSD  | Lx    | LxN   | LxS   |
|-------|--------|--------|-------|------|------|------|------|-------|-------|-------|
| 10.00 | 100.00 | 100.00 | 0.00  | 1.80 | 0.04 | 0.00 | 0.00 | 99.98 | 99.08 | 0.90  |
| 11.00 | 99.96  | 98.16  | 1.80  | 1.77 | 0.03 | 0.01 | 0.00 | 99.95 | 97.27 | 2.68  |
| 12.00 | 99.93  | 96.37  | 3.56  | 1.73 | 0.04 | 0.02 | 0.00 | 99.91 | 95.50 | 4.41  |
| 13.00 | 99.89  | 94.62  | 5.27  | 1.70 | 0.04 | 0.03 | 0.00 | 99.87 | 93.77 | 6.10  |
| 14.00 | 99.84  | 92.91  | 6.94  | 1.67 | 0.05 | 0.04 | 0.00 | 99.82 | 92.07 | 7.75  |
| 15.00 | 99.79  | 91.22  | 8.56  | 7.12 | 0.06 | 0.05 | 0.01 | 99.75 | 87.66 | 12.09 |
| 16.00 | 99.72  | 84.10  | 15.62 | 6.56 | 0.07 | 0.09 | 0.01 | 99.68 | 80.83 | 18.85 |
| 17.00 | 99.63  | 77.56  | 22.07 | 6.05 | 0.08 | 0.13 | 0.02 | 99.58 | 74.56 | 25.02 |
| 18.00 | 99.53  | 71.56  | 27.97 | 5.58 | 0.08 | 0.17 | 0.03 | 99.48 | 68.82 | 30.66 |
| 19.00 | 99.42  | 66.07  | 33.35 | 5.15 | 0.07 | 0.20 | 0.04 | 99.37 | 63.56 | 35.81 |
| 20.00 | 99.31  | 61.04  | 38.27 | 2.44 | 0.05 | 0.38 | 0.08 | 99.25 | 59.99 | 39.26 |
| 21.00 | 99.18  | 58.94  | 40.25 | 2.36 | 0.04 | 0.40 | 0.09 | 99.12 | 57.94 | 41.18 |
| 22.00 | 99.05  | 56.94  | 42.11 | 2.28 | 0.04 | 0.42 | 0.09 | 98.99 | 55.99 | 43.00 |
| 23.00 | 98.92  | 55.04  | 43.88 | 2.20 | 0.04 | 0.44 | 0.10 | 98.85 | 54.14 | 44.71 |
| 24.00 | 98.78  | 53.23  | 45.54 | 2.13 | 0.04 | 0.46 | 0.10 | 98.71 | 52.38 | 46.33 |
| 25.00 | 98.64  | 51.52  | 47.12 | 0.53 | 0.04 | 0.60 | 0.10 | 98.57 | 51.54 | 47.03 |
| 26.00 | 98.50  | 51.56  | 46.94 | 0.53 | 0.04 | 0.60 | 0.09 | 98.43 | 51.58 | 46.86 |
| 27.00 | 98.37  | 51.60  | 46.77 | 0.53 | 0.03 | 0.60 | 0.09 | 98.31 | 51.62 | 46.69 |
| 28.00 | 98.25  | 51.64  | 46.61 | 0.53 | 0.03 | 0.60 | 0.09 | 98.18 | 51.65 | 46.53 |
| 29.00 | 98.12  | 51.67  | 46.45 | 0.53 | 0.04 | 0.59 | 0.09 | 98.06 | 51.69 | 46.37 |
| 30.00 | 97.99  | 51.70  | 46.29 | 0.62 | 0.04 | 0.93 | 0.15 | 97.89 | 51.83 | 46.06 |
| 31.00 | 97.80  | 51.97  | 45.83 | 0.62 | 0.04 | 0.92 | 0.17 | 97.69 | 52.09 | 45.60 |
| 32.00 | 97.59  | 52.22  | 45.37 | 0.63 | 0.05 | 0.91 | 0.18 | 97.47 | 52.33 | 45.14 |
| 33.00 | 97.36  | 52.45  | 44.91 | 0.63 | 0.05 | 0.90 | 0.18 | 97.24 | 52.56 | 44.69 |
| 34.00 | 97.13  | 52.67  | 44.46 | 0.63 | 0.05 | 0.89 | 0.19 | 97.00 | 52.77 | 44.23 |
| 35.00 | 96.88  | 52.87  | 44.01 | 0.57 | 0.06 | 0.86 | 0.20 | 96.75 | 52.99 | 43.76 |
| 36.00 | 96.62  | 53.11  | 43.52 | 0.57 | 0.06 | 0.85 | 0.21 | 96.49 | 53.22 | 43.27 |
| 37.00 | 96.36  | 53.33  | 43.03 | 0.58 | 0.06 | 0.84 | 0.22 | 96.21 | 53.43 | 42.78 |
| 38.00 | 96.07  | 53.53  | 42.54 | 0.58 | 0.07 | 0.83 | 0.24 | 95.91 | 53.62 | 42.29 |
| 39.00 | 95.75  | 53.71  | 42.04 | 0.58 | 0.08 | 0.82 | 0.27 | 95.58 | 53.79 | 41.78 |
| 40.00 | 95.40  | 53.88  | 41.52 | 0.54 | 0.09 | 0.91 | 0.30 | 95.20 | 54.02 | 41.18 |
| 41.00 | 95.00  | 54.16  | 40.84 | 0.54 | 0.10 | 0.90 | 0.34 | 94.78 | 54.29 | 40.50 |
| 42.00 | 94.56  | 54.41  | 40.15 | 0.54 | 0.12 | 0.88 | 0.38 | 94.32 | 54.52 | 39.79 |
| 43.00 | 94.07  | 54.63  | 39.44 | 0.55 | 0.13 | 0.87 | 0.40 | 93.80 | 54.73 | 39.07 |
| 44.00 | 93.53  | 54.82  | 38.71 | 0.55 | 0.15 | 0.85 | 0.44 | 93.24 | 54.90 | 38.34 |
| 45.00 | 92.95  | 54.98  | 37.97 | 0.55 | 0.16 | 0.75 | 0.49 | 92.62 | 55.00 | 37.62 |
| 46.00 | 92.30  | 55.02  | 37.28 | 0.55 | 0.18 | 0.74 | 0.53 | 91.94 | 55.02 | 36.92 |
| 47.00 | 91.58  | 55.02  | 36.56 | 0.55 | 0.20 | 0.72 | 0.58 | 91.19 | 55.01 | 36.18 |
| 48.00 | 90.80  | 54.99  | 35.81 | 0.55 | 0.23 | 0.71 | 0.64 | 90.37 | 54.96 | 35.41 |
| 49.00 | 89.93  | 54.92  | 35.01 | 0.55 | 0.25 | 0.69 | 0.69 | 89.46 | 54.87 | 34.59 |
| 50.00 | 88.99  | 54.81  | 34.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00  | 0.00  | 0.00  |