

## MAR650 Homework Problem 2:

Review the Sverdrup's theory and use the data listed in Table 1 to determine the seasonal variability of the phytoplankton bloom at the three stations. In Table 1, "MIXED LD ( $m$ )" is the mixed layer depth and LIGHT ( $W m^{-2}$ ) is the solar irradiance. The solar irradiance in the water column is given as

$$I(z) = I_0 e^{-kz}$$

where  $I(z)$  is the light intensity at depth  $z$ ,  $I_0$  is the light intensity at the sea surface, and  $k$  is the light attenuation coefficient. The critical depth can be determined by

$$I_c D_{cr} = \frac{I_0}{k} (1 - e^{-kD_{cr}})$$

where  $I_c$  is the compensation light intensity,  $D_{cr}$  is the critical depth. In this exercise,  $I_c$  is assumed to be an e-fold value of light intensity at the sea surface (i.e.,  $I_c = I_0 e^{-1}$ ).

**Locations:** Three stations: a) Station O, located in the open ocean; b) Station C, located over Georges Bank; and c) Station GOM, located in the Gulf of Maine.

**Table 1: Mixed layer depth ( $m$ ), light intensity ( $W m^{-2}$ ), and light attenuation coefficients ( $m^{-1}$ ) at stations labeled "O, C, and GOM".**

| Time<br>day | Station O |                   | Station C |                  | Station GOM |                   |
|-------------|-----------|-------------------|-----------|------------------|-------------|-------------------|
|             | MIXED LD  | $k=0.05$<br>LIGHT | MIXED LD  | $k=0.1$<br>LIGHT | MIXED LD    | $k=0.06$<br>LIGHT |
| 1           | 300       | 62                | 40        | 60               | 150         | 55                |
| 2           | 300       | 62                | 40        | 60               | 150         | 56                |
| 3           | 300       | 63                | 40        | 60               | 150         | 56                |
| 4           | 300       | 63                | 40        | 61               | 150         | 57                |
| 5           | 300       | 63                | 40        | 61               | 150         | 57                |
| 6           | 300       | 63                | 40        | 61               | 150         | 58                |
| 7           | 300       | 64                | 40        | 62               | 150         | 59                |
| 8           | 300       | 64                | 40        | 62               | 150         | 60                |
| 9           | 300       | 64                | 40        | 62               | 150         | 61                |
| 10          | 300       | 64                | 40        | 63               | 150         | 62                |
| 11          | 300       | 65                | 40        | 63               | 150         | 64                |
| 12          | 300       | 66                | 40        | 64               | 150         | 65                |
| 13          | 300       | 66                | 40        | 65               | 150         | 66                |
| 14          | 300       | 67                | 40        | 66               | 150         | 68                |
| 15          | 300       | 67                | 40        | 66               | 150         | 69                |
| 16          | 300       | 68                | 40        | 67               | 150         | 71                |
| 17          | 300       | 69                | 40        | 68               | 150         | 72                |
| 18          | 300       | 70                | 40        | 69               | 150         | 74                |
| 19          | 300       | 71                | 40        | 70               | 150         | 75                |
| 20          | 300       | 71                | 40        | 71               | 150         | 76                |
| 21          | 300       | 72                | 40        | 72               | 150         | 77                |

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|----|-----|-----|----|-----|-----|-----|
| 22 | 300 | 73  | 40 | 73  | 150 | 78  |
| 23 | 300 | 74  | 40 | 74  | 150 | 79  |
| 24 | 300 | 75  | 40 | 75  | 150 | 80  |
| 25 | 300 | 76  | 40 | 76  | 150 | 80  |
| 26 | 300 | 77  | 40 | 77  | 150 | 81  |
| 27 | 300 | 79  | 40 | 78  | 150 | 82  |
| 28 | 300 | 80  | 40 | 79  | 150 | 82  |
| 29 | 300 | 81  | 40 | 81  | 150 | 83  |
| 30 | 300 | 82  | 40 | 82  | 150 | 84  |
| 31 | 300 | 83  | 40 | 83  | 150 | 84  |
| 32 | 300 | 85  | 40 | 84  | 150 | 85  |
| 33 | 300 | 86  | 40 | 86  | 150 | 86  |
| 34 | 300 | 87  | 40 | 87  | 150 | 87  |
| 35 | 300 | 89  | 40 | 89  | 150 | 88  |
| 36 | 300 | 90  | 40 | 90  | 150 | 89  |
| 37 | 300 | 92  | 40 | 92  | 150 | 90  |
| 38 | 300 | 93  | 40 | 93  | 150 | 92  |
| 39 | 300 | 95  | 40 | 95  | 150 | 93  |
| 40 | 300 | 97  | 40 | 97  | 150 | 95  |
| 41 | 300 | 98  | 40 | 98  | 150 | 97  |
| 42 | 300 | 100 | 40 | 100 | 150 | 98  |
| 43 | 300 | 102 | 40 | 102 | 150 | 100 |
| 44 | 300 | 103 | 40 | 104 | 150 | 102 |
| 45 | 300 | 105 | 40 | 106 | 150 | 104 |
| 46 | 300 | 107 | 40 | 108 | 148 | 106 |
| 47 | 300 | 109 | 40 | 111 | 147 | 109 |
| 48 | 300 | 111 | 40 | 113 | 145 | 111 |
| 49 | 300 | 113 | 40 | 115 | 143 | 113 |
| 50 | 300 | 115 | 40 | 117 | 142 | 116 |
| 51 | 300 | 117 | 40 | 120 | 140 | 118 |
| 52 | 300 | 119 | 40 | 122 | 138 | 121 |
| 53 | 300 | 121 | 40 | 124 | 137 | 123 |
| 54 | 300 | 123 | 40 | 127 | 135 | 126 |
| 55 | 300 | 125 | 40 | 129 | 133 | 128 |
| 56 | 300 | 127 | 40 | 132 | 132 | 131 |
| 57 | 300 | 129 | 40 | 134 | 130 | 134 |
| 58 | 300 | 131 | 40 | 136 | 128 | 136 |
| 59 | 300 | 133 | 40 | 139 | 127 | 138 |
| 60 | 300 | 135 | 40 | 141 | 125 | 141 |
| 61 | 300 | 137 | 40 | 143 | 123 | 143 |
| 62 | 300 | 139 | 40 | 145 | 122 | 145 |

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| 63  | 300 | 141 | 40 | 147 | 120 | 147 |
| 64  | 300 | 142 | 40 | 149 | 118 | 149 |
| 65  | 300 | 144 | 40 | 151 | 117 | 151 |
| 66  | 300 | 146 | 40 | 153 | 115 | 152 |
| 67  | 300 | 147 | 40 | 155 | 113 | 154 |
| 68  | 300 | 149 | 40 | 156 | 112 | 155 |
| 69  | 300 | 150 | 40 | 158 | 110 | 156 |
| 70  | 300 | 152 | 40 | 159 | 108 | 157 |
| 71  | 300 | 153 | 40 | 161 | 107 | 158 |
| 72  | 300 | 154 | 40 | 162 | 105 | 159 |
| 73  | 300 | 156 | 40 | 163 | 103 | 160 |
| 74  | 300 | 157 | 40 | 164 | 102 | 161 |
| 75  | 300 | 158 | 40 | 165 | 100 | 161 |
| 76  | 295 | 159 | 40 | 166 | 98  | 162 |
| 77  | 290 | 160 | 40 | 166 | 97  | 163 |
| 78  | 285 | 161 | 40 | 167 | 95  | 163 |
| 79  | 280 | 162 | 40 | 168 | 93  | 164 |
| 80  | 275 | 162 | 40 | 168 | 92  | 164 |
| 81  | 270 | 163 | 40 | 169 | 90  | 165 |
| 82  | 265 | 164 | 40 | 169 | 88  | 165 |
| 83  | 260 | 165 | 40 | 170 | 87  | 166 |
| 84  | 255 | 166 | 40 | 170 | 85  | 166 |
| 85  | 250 | 167 | 40 | 171 | 83  | 167 |
| 86  | 245 | 168 | 40 | 171 | 82  | 168 |
| 87  | 240 | 169 | 40 | 172 | 80  | 169 |
| 88  | 235 | 170 | 40 | 173 | 78  | 170 |
| 89  | 230 | 171 | 40 | 174 | 77  | 171 |
| 90  | 225 | 172 | 40 | 175 | 75  | 172 |
| 91  | 220 | 173 | 40 | 176 | 73  | 173 |
| 92  | 215 | 174 | 40 | 177 | 72  | 175 |
| 93  | 210 | 175 | 40 | 178 | 70  | 177 |
| 94  | 205 | 177 | 40 | 179 | 68  | 179 |
| 95  | 200 | 178 | 40 | 181 | 67  | 182 |
| 96  | 195 | 180 | 40 | 182 | 65  | 184 |
| 97  | 190 | 181 | 40 | 184 | 63  | 187 |
| 98  | 185 | 183 | 40 | 186 | 62  | 190 |
| 99  | 180 | 185 | 40 | 188 | 60  | 194 |
| 100 | 175 | 187 | 40 | 190 | 58  | 197 |
| 101 | 170 | 189 | 40 | 192 | 57  | 201 |
| 102 | 165 | 191 | 40 | 194 | 55  | 204 |
| 103 | 160 | 193 | 40 | 197 | 53  | 207 |

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| 104 | 155 | 195 | 40 | 199 | 52 | 211 |
| 105 | 150 | 197 | 40 | 201 | 50 | 214 |
| 106 | 146 | 200 | 40 | 204 | 49 | 217 |
| 107 | 142 | 202 | 40 | 206 | 48 | 219 |
| 108 | 138 | 204 | 40 | 208 | 46 | 222 |
| 109 | 134 | 206 | 40 | 211 | 45 | 224 |
| 110 | 130 | 209 | 40 | 213 | 44 | 226 |
| 111 | 126 | 211 | 40 | 215 | 43 | 227 |
| 112 | 122 | 213 | 40 | 218 | 42 | 229 |
| 113 | 118 | 216 | 40 | 220 | 41 | 230 |
| 114 | 114 | 218 | 40 | 222 | 39 | 231 |
| 115 | 110 | 220 | 40 | 224 | 38 | 233 |
| 116 | 106 | 222 | 40 | 226 | 37 | 234 |
| 117 | 102 | 224 | 40 | 228 | 36 | 235 |
| 118 | 98  | 226 | 40 | 229 | 35 | 236 |
| 119 | 94  | 228 | 40 | 231 | 34 | 236 |
| 120 | 90  | 230 | 40 | 233 | 32 | 238 |
| 121 | 86  | 231 | 40 | 234 | 31 | 239 |
| 122 | 82  | 233 | 40 | 235 | 30 | 240 |
| 123 | 78  | 234 | 40 | 236 | 29 | 241 |
| 124 | 74  | 235 | 40 | 237 | 28 | 242 |
| 125 | 70  | 237 | 40 | 238 | 27 | 244 |
| 126 | 66  | 238 | 40 | 239 | 25 | 245 |
| 127 | 62  | 238 | 40 | 239 | 24 | 247 |
| 128 | 58  | 239 | 40 | 240 | 23 | 248 |
| 129 | 54  | 240 | 40 | 240 | 22 | 249 |
| 130 | 50  | 240 | 40 | 240 | 21 | 251 |
| 131 | 46  | 241 | 40 | 240 | 20 | 252 |
| 132 | 42  | 241 | 40 | 240 | 18 | 252 |
| 133 | 38  | 241 | 40 | 239 | 17 | 253 |
| 134 | 34  | 241 | 40 | 239 | 16 | 253 |
| 135 | 30  | 241 | 40 | 239 | 15 | 253 |
| 136 | 30  | 241 | 40 | 238 | 15 | 252 |
| 137 | 29  | 241 | 40 | 237 | 15 | 251 |
| 138 | 29  | 240 | 40 | 237 | 15 | 250 |
| 139 | 29  | 240 | 40 | 236 | 15 | 248 |
| 140 | 28  | 239 | 40 | 235 | 15 | 246 |
| 141 | 28  | 239 | 40 | 234 | 15 | 244 |
| 142 | 28  | 238 | 40 | 233 | 15 | 243 |
| 143 | 27  | 238 | 40 | 232 | 15 | 241 |
| 144 | 27  | 237 | 40 | 231 | 15 | 239 |

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| 145 | 27 | 237 | 40 | 230 | 15 | 238 |
| 146 | 26 | 236 | 40 | 230 | 15 | 237 |
| 147 | 26 | 236 | 40 | 229 | 15 | 236 |
| 148 | 26 | 235 | 40 | 228 | 15 | 236 |
| 149 | 25 | 235 | 40 | 228 | 15 | 236 |
| 150 | 25 | 234 | 40 | 227 | 15 | 236 |
| 151 | 25 | 234 | 40 | 227 | 15 | 236 |
| 152 | 24 | 234 | 40 | 227 | 15 | 237 |
| 153 | 24 | 234 | 40 | 227 | 15 | 238 |
| 154 | 24 | 234 | 40 | 227 | 15 | 238 |
| 155 | 23 | 234 | 40 | 227 | 15 | 239 |
| 156 | 23 | 234 | 40 | 227 | 15 | 240 |
| 157 | 23 | 234 | 40 | 228 | 15 | 240 |
| 158 | 22 | 234 | 40 | 228 | 15 | 241 |
| 159 | 22 | 234 | 40 | 229 | 15 | 241 |
| 160 | 22 | 235 | 40 | 230 | 15 | 242 |
| 161 | 21 | 235 | 40 | 231 | 15 | 242 |
| 162 | 21 | 235 | 40 | 232 | 15 | 243 |
| 163 | 21 | 236 | 40 | 233 | 15 | 244 |
| 164 | 20 | 236 | 40 | 234 | 15 | 245 |
| 165 | 20 | 237 | 40 | 236 | 15 | 246 |
| 166 | 20 | 238 | 40 | 237 | 15 | 248 |
| 167 | 20 | 238 | 40 | 238 | 15 | 250 |
| 168 | 20 | 239 | 40 | 240 | 15 | 253 |
| 169 | 20 | 240 | 40 | 241 | 15 | 255 |
| 170 | 20 | 240 | 40 | 243 | 15 | 259 |
| 171 | 20 | 241 | 40 | 244 | 15 | 262 |
| 172 | 20 | 241 | 40 | 246 | 15 | 266 |
| 173 | 20 | 242 | 40 | 247 | 15 | 270 |
| 174 | 20 | 242 | 40 | 248 | 15 | 274 |
| 175 | 20 | 243 | 40 | 250 | 15 | 278 |
| 176 | 20 | 243 | 40 | 251 | 15 | 282 |
| 177 | 20 | 244 | 40 | 252 | 15 | 286 |
| 178 | 20 | 244 | 40 | 253 | 15 | 289 |
| 179 | 20 | 244 | 40 | 254 | 15 | 292 |
| 180 | 20 | 244 | 40 | 255 | 15 | 294 |
| 181 | 20 | 244 | 40 | 256 | 15 | 296 |
| 182 | 20 | 244 | 40 | 256 | 15 | 297 |
| 183 | 20 | 244 | 40 | 257 | 15 | 298 |
| 184 | 20 | 244 | 40 | 257 | 15 | 298 |
| 185 | 20 | 244 | 40 | 258 | 15 | 297 |

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| 186 | 20 | 244 | 40 | 258 | 15 | 296 |
| 187 | 20 | 243 | 40 | 258 | 15 | 295 |
| 188 | 20 | 243 | 40 | 258 | 15 | 293 |
| 189 | 20 | 243 | 40 | 258 | 15 | 292 |
| 190 | 20 | 242 | 40 | 258 | 15 | 290 |
| 191 | 20 | 242 | 40 | 258 | 15 | 288 |
| 192 | 20 | 241 | 40 | 257 | 15 | 286 |
| 193 | 20 | 240 | 40 | 257 | 15 | 284 |
| 194 | 20 | 240 | 40 | 257 | 15 | 282 |
| 195 | 20 | 239 | 40 | 256 | 15 | 281 |
| 196 | 20 | 238 | 40 | 256 | 15 | 279 |
| 197 | 20 | 238 | 40 | 255 | 15 | 278 |
| 198 | 20 | 237 | 40 | 255 | 15 | 276 |
| 199 | 20 | 236 | 40 | 254 | 15 | 275 |
| 200 | 20 | 235 | 40 | 254 | 15 | 274 |
| 201 | 20 | 235 | 40 | 253 | 15 | 272 |
| 202 | 20 | 234 | 40 | 253 | 15 | 271 |
| 203 | 20 | 233 | 40 | 252 | 15 | 269 |
| 204 | 20 | 232 | 40 | 252 | 15 | 267 |
| 205 | 20 | 232 | 40 | 251 | 15 | 265 |
| 206 | 20 | 231 | 40 | 251 | 15 | 262 |
| 207 | 20 | 230 | 40 | 250 | 15 | 259 |
| 208 | 20 | 229 | 40 | 250 | 15 | 256 |
| 209 | 20 | 229 | 40 | 249 | 15 | 253 |
| 210 | 20 | 228 | 40 | 249 | 15 | 249 |
| 211 | 20 | 227 | 40 | 248 | 15 | 245 |
| 212 | 20 | 227 | 40 | 248 | 15 | 241 |
| 213 | 20 | 226 | 40 | 248 | 15 | 238 |
| 214 | 20 | 225 | 40 | 247 | 15 | 234 |
| 215 | 20 | 225 | 40 | 247 | 15 | 231 |
| 216 | 20 | 224 | 40 | 246 | 15 | 228 |
| 217 | 20 | 223 | 40 | 246 | 15 | 226 |
| 218 | 20 | 222 | 40 | 246 | 15 | 224 |
| 219 | 20 | 222 | 40 | 245 | 15 | 223 |
| 220 | 20 | 221 | 40 | 245 | 15 | 223 |
| 221 | 20 | 220 | 40 | 244 | 15 | 223 |
| 222 | 20 | 220 | 40 | 244 | 15 | 224 |
| 223 | 20 | 219 | 40 | 243 | 15 | 225 |
| 224 | 20 | 218 | 40 | 243 | 15 | 228 |
| 225 | 20 | 217 | 40 | 242 | 15 | 230 |
| 226 | 20 | 217 | 40 | 242 | 15 | 233 |

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| 227 | 20 | 216 | 40 | 241 | 15 | 236 |
| 228 | 20 | 215 | 40 | 240 | 15 | 239 |
| 229 | 20 | 214 | 40 | 240 | 15 | 242 |
| 230 | 20 | 214 | 40 | 239 | 15 | 245 |
| 231 | 20 | 213 | 40 | 238 | 16 | 248 |
| 232 | 20 | 212 | 40 | 237 | 16 | 249 |
| 233 | 20 | 211 | 40 | 236 | 16 | 251 |
| 234 | 20 | 210 | 40 | 235 | 16 | 251 |
| 235 | 20 | 209 | 40 | 233 | 16 | 251 |
| 236 | 20 | 208 | 40 | 232 | 16 | 251 |
| 237 | 20 | 208 | 40 | 231 | 17 | 250 |
| 238 | 20 | 207 | 40 | 230 | 17 | 248 |
| 239 | 20 | 206 | 40 | 228 | 17 | 246 |
| 240 | 20 | 205 | 40 | 227 | 17 | 243 |
| 241 | 20 | 204 | 40 | 225 | 17 | 240 |
| 242 | 20 | 203 | 40 | 224 | 17 | 237 |
| 243 | 20 | 201 | 40 | 222 | 18 | 234 |
| 244 | 20 | 200 | 40 | 220 | 18 | 231 |
| 245 | 20 | 199 | 40 | 219 | 18 | 228 |
| 246 | 20 | 198 | 40 | 217 | 18 | 224 |
| 247 | 20 | 197 | 40 | 215 | 18 | 221 |
| 248 | 20 | 196 | 40 | 213 | 18 | 218 |
| 249 | 20 | 194 | 40 | 211 | 19 | 215 |
| 250 | 20 | 193 | 40 | 210 | 19 | 212 |
| 251 | 20 | 192 | 40 | 208 | 19 | 210 |
| 252 | 20 | 191 | 40 | 206 | 19 | 207 |
| 253 | 20 | 189 | 40 | 204 | 19 | 204 |
| 254 | 20 | 188 | 40 | 202 | 19 | 200 |
| 255 | 20 | 186 | 40 | 200 | 20 | 197 |
| 256 | 20 | 185 | 40 | 198 | 20 | 194 |
| 257 | 20 | 184 | 40 | 196 | 20 | 191 |
| 258 | 20 | 182 | 40 | 194 | 20 | 188 |
| 259 | 21 | 181 | 40 | 193 | 21 | 185 |
| 260 | 22 | 179 | 40 | 191 | 21 | 182 |
| 261 | 23 | 178 | 40 | 189 | 22 | 179 |
| 262 | 24 | 176 | 40 | 187 | 22 | 176 |
| 263 | 25 | 174 | 40 | 185 | 23 | 174 |
| 264 | 26 | 173 | 40 | 183 | 23 | 171 |
| 265 | 27 | 171 | 40 | 181 | 24 | 170 |
| 266 | 28 | 169 | 40 | 179 | 24 | 168 |
| 267 | 29 | 168 | 40 | 177 | 25 | 167 |

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| 268 | 30 | 166 | 40 | 175 | 25 | 166 |
| 269 | 31 | 164 | 40 | 173 | 26 | 165 |
| 270 | 32 | 162 | 40 | 171 | 26 | 164 |
| 271 | 33 | 160 | 40 | 169 | 27 | 164 |
| 272 | 34 | 158 | 40 | 166 | 27 | 163 |
| 273 | 35 | 156 | 40 | 164 | 28 | 163 |
| 274 | 36 | 154 | 40 | 162 | 28 | 162 |
| 275 | 37 | 152 | 40 | 160 | 29 | 161 |
| 276 | 38 | 150 | 40 | 158 | 29 | 160 |
| 277 | 39 | 148 | 40 | 155 | 30 | 158 |
| 278 | 40 | 146 | 40 | 153 | 30 | 157 |
| 279 | 41 | 144 | 40 | 151 | 31 | 155 |
| 280 | 42 | 142 | 40 | 148 | 31 | 153 |
| 281 | 43 | 140 | 40 | 146 | 32 | 151 |
| 282 | 44 | 138 | 40 | 143 | 32 | 148 |
| 283 | 45 | 135 | 40 | 141 | 33 | 145 |
| 284 | 46 | 133 | 40 | 138 | 33 | 142 |
| 285 | 47 | 131 | 40 | 136 | 34 | 139 |
| 286 | 48 | 129 | 40 | 133 | 34 | 136 |
| 287 | 49 | 126 | 40 | 131 | 35 | 133 |
| 288 | 50 | 124 | 40 | 128 | 35 | 130 |
| 289 | 51 | 122 | 40 | 125 | 35 | 126 |
| 290 | 52 | 119 | 40 | 123 | 36 | 123 |
| 291 | 52 | 117 | 40 | 120 | 36 | 119 |
| 292 | 53 | 115 | 40 | 118 | 37 | 116 |
| 293 | 54 | 113 | 40 | 115 | 37 | 112 |
| 294 | 55 | 111 | 40 | 113 | 38 | 109 |
| 295 | 56 | 109 | 40 | 110 | 38 | 105 |
| 296 | 56 | 106 | 40 | 108 | 39 | 102 |
| 297 | 57 | 104 | 40 | 105 | 39 | 99  |
| 298 | 58 | 102 | 40 | 103 | 40 | 95  |
| 299 | 59 | 100 | 40 | 101 | 40 | 92  |
| 300 | 60 | 99  | 40 | 99  | 41 | 89  |
| 301 | 60 | 97  | 40 | 97  | 41 | 87  |
| 302 | 61 | 95  | 40 | 95  | 42 | 84  |
| 303 | 62 | 93  | 40 | 93  | 42 | 82  |
| 304 | 63 | 92  | 40 | 91  | 43 | 80  |
| 305 | 64 | 90  | 40 | 89  | 43 | 78  |
| 306 | 65 | 88  | 40 | 88  | 44 | 77  |
| 307 | 65 | 87  | 40 | 86  | 44 | 76  |
| 308 | 66 | 85  | 40 | 84  | 45 | 75  |

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| 309 | 67  | 84 | 40 | 83 | 45  | 74 |
| 310 | 68  | 83 | 40 | 82 | 46  | 74 |
| 311 | 69  | 82 | 40 | 81 | 46  | 74 |
| 312 | 69  | 80 | 40 | 79 | 47  | 74 |
| 313 | 70  | 79 | 40 | 78 | 47  | 74 |
| 314 | 71  | 78 | 40 | 77 | 48  | 74 |
| 315 | 72  | 77 | 40 | 76 | 48  | 75 |
| 316 | 73  | 76 | 40 | 75 | 49  | 75 |
| 317 | 73  | 75 | 40 | 74 | 49  | 75 |
| 318 | 74  | 74 | 40 | 74 | 50  | 76 |
| 319 | 75  | 74 | 40 | 73 | 50  | 76 |
| 320 | 77  | 73 | 40 | 72 | 54  | 76 |
| 321 | 78  | 72 | 40 | 72 | 57  | 76 |
| 322 | 80  | 72 | 40 | 71 | 61  | 76 |
| 323 | 81  | 71 | 40 | 70 | 65  | 76 |
| 324 | 83  | 70 | 40 | 70 | 69  | 75 |
| 325 | 84  | 70 | 40 | 69 | 72  | 75 |
| 326 | 86  | 69 | 40 | 69 | 76  | 74 |
| 327 | 87  | 69 | 40 | 68 | 80  | 74 |
| 328 | 89  | 68 | 40 | 68 | 83  | 73 |
| 329 | 90  | 68 | 40 | 67 | 87  | 72 |
| 330 | 92  | 68 | 40 | 67 | 91  | 71 |
| 331 | 93  | 67 | 40 | 67 | 94  | 71 |
| 332 | 95  | 67 | 40 | 66 | 98  | 70 |
| 333 | 96  | 67 | 40 | 66 | 102 | 69 |
| 334 | 98  | 66 | 40 | 66 | 106 | 68 |
| 335 | 99  | 66 | 40 | 66 | 109 | 67 |
| 336 | 101 | 66 | 40 | 66 | 113 | 66 |
| 337 | 102 | 66 | 40 | 65 | 117 | 66 |
| 338 | 104 | 66 | 40 | 65 | 120 | 65 |
| 339 | 105 | 66 | 40 | 65 | 124 | 64 |
| 340 | 107 | 66 | 40 | 65 | 128 | 64 |
| 341 | 108 | 66 | 40 | 65 | 131 | 63 |
| 342 | 110 | 65 | 40 | 65 | 135 | 63 |
| 343 | 111 | 66 | 40 | 65 | 139 | 62 |
| 344 | 113 | 66 | 40 | 65 | 143 | 62 |
| 345 | 114 | 66 | 40 | 65 | 146 | 62 |
| 346 | 116 | 66 | 40 | 65 | 150 | 62 |
| 347 | 117 | 66 | 40 | 65 | 150 | 62 |
| 348 | 119 | 66 | 40 | 66 | 150 | 62 |
| 349 | 120 | 66 | 40 | 66 | 150 | 62 |

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| 350 | 131 | 67 | 40 | 66 | 150 | 62 |
| 351 | 143 | 67 | 40 | 66 | 150 | 63 |
| 352 | 154 | 68 | 40 | 66 | 150 | 63 |
| 353 | 165 | 68 | 40 | 66 | 150 | 63 |
| 354 | 176 | 68 | 40 | 67 | 150 | 64 |
| 355 | 188 | 69 | 40 | 67 | 150 | 64 |
| 356 | 199 | 69 | 40 | 67 | 150 | 64 |
| 357 | 210 | 69 | 40 | 66 | 150 | 65 |
| 358 | 221 | 70 | 40 | 66 | 150 | 65 |
| 359 | 233 | 70 | 40 | 67 | 150 | 65 |
| 360 | 244 | 70 | 40 | 67 | 150 | 65 |
| 361 | 255 | 70 | 40 | 67 | 150 | 66 |
| 362 | 266 | 71 | 40 | 67 | 150 | 66 |
| 363 | 278 | 71 | 40 | 67 | 150 | 66 |
| 364 | 289 | 71 | 40 | 67 | 150 | 66 |
| 365 | 300 | 72 | 40 | 67 | 150 | 66 |