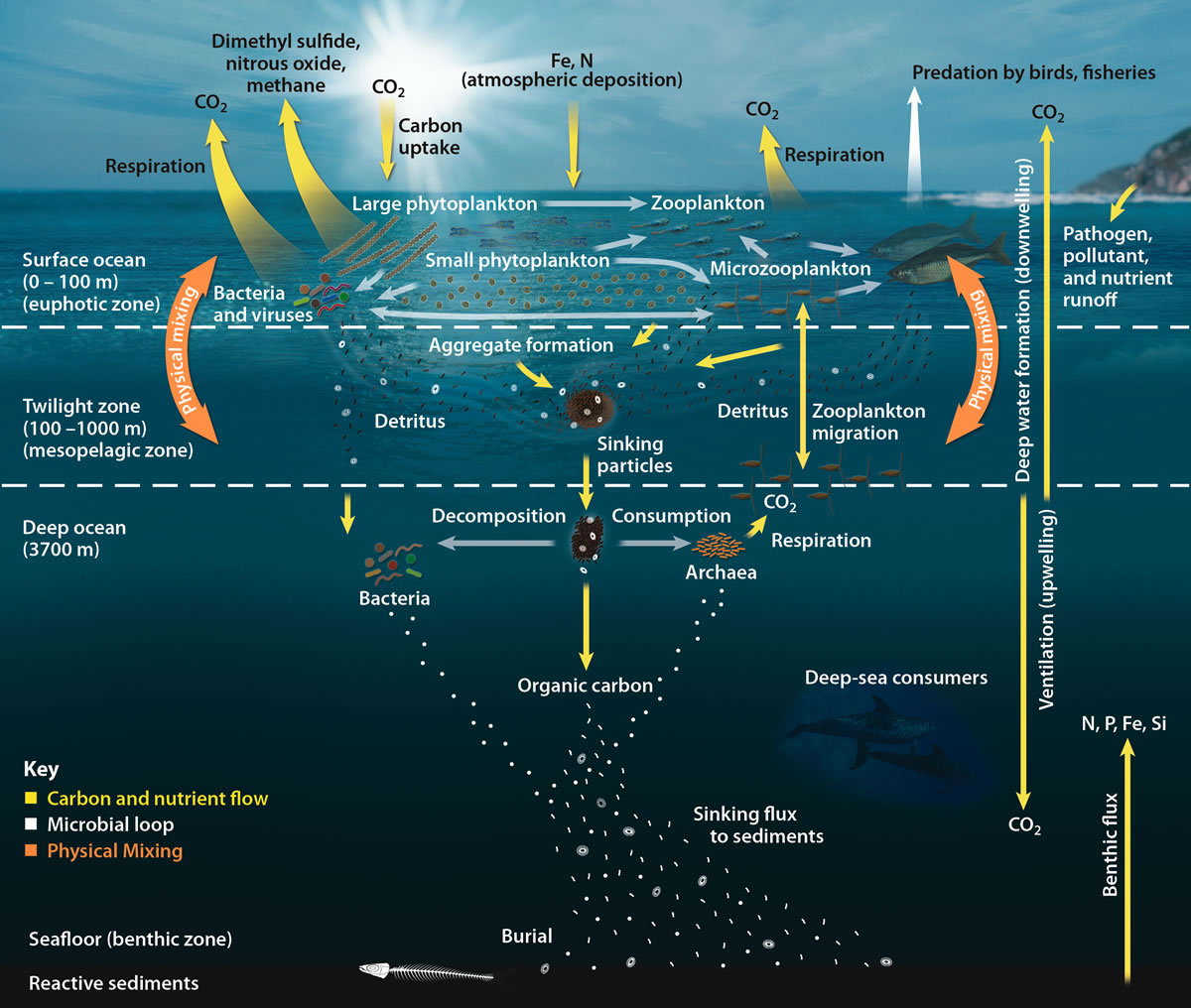
**Appendix**

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**Appendix 1.1:** Values Utilized to Calculate Primary Productivity

|  |  |  |
| --- | --- | --- |
|  | **Amount** | **Units** |
| **Ps** | 4.07 | mg\*C/m^3\*hr |
| **α** | 0.008 | mg\*C/m^3\*hr |
| **β** | 0.005 | mg\*C/m^3\*hr |

**Appendix 1.2:** Primary Productivity as a Function of PAR Irradiance

|  |  |  |  |
| --- | --- | --- | --- |
| **[1-exp(-αI/Ps)]** | **exp[-βI/Ps]** | **Irradiance (I)** | **Productivity** |
| 0 | 1 | 0 | 0.00000 |
| 0.007992143 | 0.998772253 | 1 | 0.00798 |
| 0.015968592 | 0.997546014 | 2 | 0.01593 |
| 0.023929377 | 0.996321279 | 3 | 0.02384 |
| 0.031874531 | 0.995098049 | 4 | 0.03172 |
| 0.039804082 | 0.99387632 | 5 | 0.03956 |
| 0.047718063 | 0.992656092 | 6 | 0.04737 |
| 0.055616503 | 0.991437361 | 7 | 0.05514 |
| 0.063499433 | 0.990220127 | 8 | 0.06288 |
| 0.071366884 | 0.989004388 | 9 | 0.07058 |
| 0.079218885 | 0.98779014 | 10 | 0.07825 |
| 0.087055468 | 0.986577384 | 11 | 0.08589 |
| 0.094876663 | 0.985366117 | 12 | 0.09349 |
| 0.102682499 | 0.984156337 | 13 | 0.10106 |
| 0.110473007 | 0.982948042 | 14 | 0.10859 |
| 0.118248217 | 0.98174123 | 15 | 0.11609 |
| 0.126008159 | 0.9805359 | 16 | 0.12356 |
| 0.133752863 | 0.97933205 | 17 | 0.13099 |
| 0.141482359 | 0.978129679 | 18 | 0.13839 |
| 0.149196677 | 0.976928783 | 19 | 0.14575 |
| 0.156895847 | 0.975729361 | 20 | 0.15309 |
| 0.164579897 | 0.974531413 | 21 | 0.16039 |
| 0.172248859 | 0.973334935 | 22 | 0.16766 |
| 0.179902762 | 0.972139926 | 23 | 0.17489 |
| 0.187541635 | 0.970946384 | 24 | 0.18209 |
| 0.195165507 | 0.969754308 | 25 | 0.18926 |
| 0.202774409 | 0.968563695 | 26 | 0.19640 |
| 0.21036837 | 0.967374544 | 27 | 0.20351 |
| 0.217947418 | 0.966186852 | 28 | 0.21058 |
| 0.225511584 | 0.96500062 | 29 | 0.21762 |
| 0.233060896 | 0.963815843 | 30 | 0.22463 |
| 0.240595383 | 0.962632521 | 31 | 0.23160 |
| 0.248115076 | 0.961450652 | 32 | 0.23855 |
| 0.255620002 | 0.960270234 | 33 | 0.24546 |
| 0.263110191 | 0.959091265 | 34 | 0.25235 |
| 0.270585672 | 0.957913744 | 35 | 0.25920 |
| 0.278046473 | 0.956737668 | 36 | 0.26602 |
| 0.285492624 | 0.955563036 | 37 | 0.27281 |
| 0.292924153 | 0.954389847 | 38 | 0.27956 |
| 0.300341089 | 0.953218097 | 39 | 0.28629 |
| 0.307743461 | 0.952047787 | 40 | 0.29299 |
| 0.315131296 | 0.950878913 | 41 | 0.29965 |
| 0.322504625 | 0.949711474 | 42 | 0.30629 |
| 0.329863474 | 0.948545469 | 43 | 0.31289 |
| 0.337207874 | 0.947380895 | 44 | 0.31946 |
| 0.344537851 | 0.946217751 | 45 | 0.32601 |
| 0.351853435 | 0.945056035 | 46 | 0.33252 |
| 0.359154653 | 0.943895746 | 47 | 0.33900 |
| 0.366441534 | 0.942736881 | 48 | 0.34546 |
| 0.373714106 | 0.941579438 | 49 | 0.35188 |
| 0.380972397 | 0.940423417 | 50 | 0.35828 |
| 0.388216435 | 0.939268815 | 51 | 0.36464 |
| 0.395446248 | 0.938115631 | 52 | 0.37097 |
| 0.402661864 | 0.936963862 | 53 | 0.37728 |
| 0.409863311 | 0.935813508 | 54 | 0.38356 |
| 0.417050617 | 0.934664565 | 55 | 0.38980 |
| 0.42422381 | 0.933517034 | 56 | 0.39602 |
| 0.431382916 | 0.932370911 | 57 | 0.40221 |
| 0.438527965 | 0.931226196 | 58 | 0.40837 |
| 0.445658983 | 0.930082886 | 59 | 0.41450 |
| 0.452775998 | 0.928940979 | 60 | 0.42060 |
| 0.459879037 | 0.927800475 | 61 | 0.42668 |
| 0.466968128 | 0.926661371 | 62 | 0.43272 |
| 0.474043299 | 0.925523665 | 63 | 0.43874 |
| 0.481104577 | 0.924387356 | 64 | 0.44473 |
| 0.488151988 | 0.923252442 | 65 | 0.45069 |
| 0.495185561 | 0.922118922 | 66 | 0.45662 |
| 0.502205322 | 0.920986793 | 67 | 0.46252 |
| 0.509211298 | 0.919856055 | 68 | 0.46840 |
| 0.516203517 | 0.918726704 | 69 | 0.47425 |
| 0.523182006 | 0.91759874 | 70 | 0.48007 |
| 0.530146791 | 0.916472161 | 71 | 0.48586 |
| 0.5370979 | 0.915346965 | 72 | 0.49163 |
| 0.544035359 | 0.914223151 | 73 | 0.49737 |
| 0.550959195 | 0.913100716 | 74 | 0.50308 |
| 0.557869435 | 0.91197966 | 75 | 0.50877 |
| 0.564766105 | 0.910859979 | 76 | 0.51442 |
| 0.571649233 | 0.909741674 | 77 | 0.52005 |
| 0.578518844 | 0.908624741 | 78 | 0.52566 |
| 0.585374966 | 0.90750918 | 79 | 0.53123 |
| 0.592217625 | 0.906394989 | 80 | 0.53678 |
| 0.599046847 | 0.905282165 | 81 | 0.54231 |
| 0.605862658 | 0.904170707 | 82 | 0.54780 |
| 0.612665086 | 0.903060615 | 83 | 0.55327 |
| 0.619454155 | 0.901951885 | 84 | 0.55872 |
| 0.626229894 | 0.900844516 | 85 | 0.56414 |
| 0.632992327 | 0.899738507 | 86 | 0.56953 |
| 0.639741481 | 0.898633856 | 87 | 0.57489 |
| 0.646477381 | 0.897530561 | 88 | 0.58023 |
| 0.653200055 | 0.89642862 | 89 | 0.58555 |
| 0.659909527 | 0.895328033 | 90 | 0.59084 |
| 0.666605824 | 0.894228797 | 91 | 0.59610 |
| 0.673288972 | 0.89313091 | 92 | 0.60134 |
| 0.679958997 | 0.892034371 | 93 | 0.60655 |
| 0.686615923 | 0.890939179 | 94 | 0.61173 |
| 0.693259778 | 0.889845331 | 95 | 0.61689 |
| 0.699890586 | 0.888752826 | 96 | 0.62203 |
| 0.706508374 | 0.887661663 | 97 | 0.62714 |
| 0.713113166 | 0.886571839 | 98 | 0.63223 |
| 0.719704989 | 0.885483353 | 99 | 0.63729 |
| 0.726283868 | 0.884396203 | 100 | 0.64232 |
| 0.732849828 | 0.883310389 | 101 | 0.64733 |
| 0.739402894 | 0.882225907 | 102 | 0.65232 |
| 0.745943093 | 0.881142757 | 103 | 0.65728 |
| 0.752470448 | 0.880060937 | 104 | 0.66222 |
| 0.758984986 | 0.878980444 | 105 | 0.66713 |
| 0.765486732 | 0.877901279 | 106 | 0.67202 |
| 0.77197571 | 0.876823438 | 107 | 0.67689 |
| 0.778451946 | 0.875746921 | 108 | 0.68173 |
| 0.784915465 | 0.874671725 | 109 | 0.68654 |
| 0.791366292 | 0.87359785 | 110 | 0.69134 |
| 0.797804451 | 0.872525293 | 111 | 0.69610 |
| 0.804229968 | 0.871454053 | 112 | 0.70085 |
| 0.810642867 | 0.870384128 | 113 | 0.70557 |
| 0.817043174 | 0.869315516 | 114 | 0.71027 |
| 0.823430912 | 0.868248217 | 115 | 0.71494 |
| 0.829806107 | 0.867182228 | 116 | 0.71959 |
| 0.836168783 | 0.866117547 | 117 | 0.72422 |
| 0.842518965 | 0.865054174 | 118 | 0.72882 |
| 0.848856678 | 0.863992107 | 119 | 0.73341 |
| 0.855181945 | 0.862931343 | 120 | 0.73796 |
| 0.861494791 | 0.861871882 | 121 | 0.74250 |
| 0.867795241 | 0.860813721 | 122 | 0.74701 |
| 0.874083319 | 0.85975686 | 123 | 0.75150 |
| 0.88035905 | 0.858701296 | 124 | 0.75597 |
| 0.886622456 | 0.857647028 | 125 | 0.76041 |
| 0.892873564 | 0.856594054 | 126 | 0.76483 |
| 0.899112396 | 0.855542374 | 127 | 0.76923 |
| 0.905338978 | 0.854491984 | 128 | 0.77360 |
| 0.911553332 | 0.853442884 | 129 | 0.77796 |
| 0.917755484 | 0.852395072 | 130 | 0.78229 |
| 0.923945456 | 0.851348547 | 131 | 0.78660 |
| 0.930123274 | 0.850303306 | 132 | 0.79089 |
| 0.93628896 | 0.849259349 | 133 | 0.79515 |
| 0.942442539 | 0.848216674 | 134 | 0.79940 |
| 0.948584034 | 0.847175278 | 135 | 0.80362 |
| 0.954713469 | 0.846135161 | 136 | 0.80782 |
| 0.960830869 | 0.845096321 | 137 | 0.81199 |
| 0.966936255 | 0.844058757 | 138 | 0.81615 |
| 0.973029653 | 0.843022466 | 139 | 0.82029 |
| 0.979111085 | 0.841987448 | 140 | 0.82440 |
| 0.985180575 | 0.840953701 | 141 | 0.82849 |
| 0.991238147 | 0.839921222 | 142 | 0.83256 |
| 0.997283824 | 0.838890012 | 143 | 0.83661 |
| 1.003317629 | 0.837860067 | 144 | 0.84064 |
| 1.009339585 | 0.836831387 | 145 | 0.84465 |
| 1.015349717 | 0.83580397 | 146 | 0.84863 |
| 1.021348046 | 0.834777814 | 147 | 0.85260 |
| 1.027334597 | 0.833752918 | 148 | 0.85654 |
| 1.033309392 | 0.83272928 | 149 | 0.86047 |
| 1.039272455 | 0.8317069 | 150 | 0.86437 |
| 1.045223808 | 0.830685774 | 151 | 0.86825 |
| 1.051163475 | 0.829665902 | 152 | 0.87211 |
| 1.057091478 | 0.828647282 | 153 | 0.87596 |
| 1.06300784 | 0.827629913 | 154 | 0.87978 |
| 1.068912585 | 0.826613793 | 155 | 0.88358 |
| 1.074805734 | 0.825598921 | 156 | 0.88736 |
| 1.080687312 | 0.824585294 | 157 | 0.89112 |
| 1.08655734 | 0.823572912 | 158 | 0.89486 |
| 1.092415841 | 0.822561773 | 159 | 0.89858 |
| 1.098262838 | 0.821551875 | 160 | 0.90228 |
| 1.104098353 | 0.820543217 | 161 | 0.90596 |
| 1.109922409 | 0.819535798 | 162 | 0.90962 |
| 1.115735029 | 0.818529615 | 163 | 0.91326 |
| 1.121536235 | 0.817524668 | 164 | 0.91688 |
| 1.127326049 | 0.816520955 | 165 | 0.92049 |
| 1.133104494 | 0.815518474 | 166 | 0.92407 |
| 1.138871592 | 0.814517223 | 167 | 0.92763 |
| 1.144627365 | 0.813517202 | 168 | 0.93117 |
| 1.150371835 | 0.812518409 | 169 | 0.93470 |
| 1.156105026 | 0.811520842 | 170 | 0.93820 |
| 1.161826958 | 0.8105245 | 171 | 0.94169 |
| 1.167537655 | 0.809529381 | 172 | 0.94516 |
| 1.173237137 | 0.808535484 | 173 | 0.94860 |
| 1.178925427 | 0.807542807 | 174 | 0.95203 |
| 1.184602548 | 0.806551349 | 175 | 0.95544 |
| 1.190268521 | 0.805561108 | 176 | 0.95883 |
| 1.195923367 | 0.804572082 | 177 | 0.96221 |
| 1.201567109 | 0.803584272 | 178 | 0.96556 |
| 1.207199769 | 0.802597673 | 179 | 0.96890 |
| 1.212821368 | 0.801612287 | 180 | 0.97221 |
| 1.218431928 | 0.80062811 | 181 | 0.97551 |
| 1.224031471 | 0.799645141 | 182 | 0.97879 |
| 1.229620018 | 0.798663379 | 183 | 0.98205 |
| 1.235197591 | 0.797682823 | 184 | 0.98530 |
| 1.240764211 | 0.79670347 | 185 | 0.98852 |
| 1.246319901 | 0.79572532 | 186 | 0.99173 |
| 1.251864681 | 0.79474837 | 187 | 0.99492 |
| 1.257398573 | 0.79377262 | 188 | 0.99809 |
| 1.262921598 | 0.792798069 | 189 | 1.00124 |
| 1.268433777 | 0.791824713 | 190 | 1.00438 |
| 1.273935133 | 0.790852553 | 191 | 1.00749 |
| 1.279425686 | 0.789881586 | 192 | 1.01059 |
| 1.284905457 | 0.788911811 | 193 | 1.01368 |
| 1.290374467 | 0.787943227 | 194 | 1.01674 |
| 1.295832739 | 0.786975832 | 195 | 1.01979 |
| 1.301280292 | 0.786009625 | 196 | 1.02282 |
| 1.306717147 | 0.785044604 | 197 | 1.02583 |
| 1.312143327 | 0.784080768 | 198 | 1.02883 |
| 1.317558851 | 0.783118115 | 199 | 1.03180 |
| 1.322963742 | 0.782156645 | 200 | 1.03476 |
| 1.328358018 | 0.781196354 | 201 | 1.03771 |
| 1.333741702 | 0.780237243 | 202 | 1.04063 |
| 1.339114814 | 0.779279309 | 203 | 1.04354 |
| 1.344477376 | 0.778322551 | 204 | 1.04644 |
| 1.349829407 | 0.777366968 | 205 | 1.04931 |
| 1.355170928 | 0.776412558 | 206 | 1.05217 |
| 1.36050196 | 0.77545932 | 207 | 1.05501 |
| 1.365822524 | 0.774507252 | 208 | 1.05784 |
| 1.37113264 | 0.773556353 | 209 | 1.06065 |
| 1.376432329 | 0.772606622 | 210 | 1.06344 |
| 1.381721611 | 0.771658056 | 211 | 1.06622 |
| 1.387000506 | 0.770710656 | 212 | 1.06898 |
| 1.392269036 | 0.769764418 | 213 | 1.07172 |
| 1.39752722 | 0.768819342 | 214 | 1.07445 |
| 1.402775078 | 0.767875426 | 215 | 1.07716 |
| 1.408012631 | 0.76693267 | 216 | 1.07985 |
| 1.4132399 | 0.765991071 | 217 | 1.08253 |
| 1.418456904 | 0.765050627 | 218 | 1.08519 |
| 1.423663663 | 0.764111339 | 219 | 1.08784 |
| 1.428860198 | 0.763173203 | 220 | 1.09047 |
| 1.434046529 | 0.76223622 | 221 | 1.09308 |
| 1.439222676 | 0.761300387 | 222 | 1.09568 |
| 1.444388658 | 0.760365702 | 223 | 1.09826 |
| 1.449544496 | 0.759432166 | 224 | 1.10083 |
| 1.45469021 | 0.758499775 | 225 | 1.10338 |
| 1.459825819 | 0.75756853 | 226 | 1.10592 |
| 1.464951343 | 0.756638427 | 227 | 1.10844 |
| 1.470066803 | 0.755709467 | 228 | 1.11094 |
| 1.475172217 | 0.754781647 | 229 | 1.11343 |
| 1.480267607 | 0.753854966 | 230 | 1.11591 |
| 1.48535299 | 0.752929423 | 231 | 1.11837 |
| 1.490428388 | 0.752005016 | 232 | 1.12081 |
| 1.495493819 | 0.751081744 | 233 | 1.12324 |
| 1.500549303 | 0.750159606 | 234 | 1.12565 |
| 1.50559486 | 0.7492386 | 235 | 1.12805 |
| 1.510630509 | 0.748318724 | 236 | 1.13043 |
| 1.51565627 | 0.747399978 | 237 | 1.13280 |
| 1.520672162 | 0.74648236 | 238 | 1.13515 |
| 1.525678204 | 0.745565869 | 239 | 1.13749 |
| 1.530674416 | 0.744650502 | 240 | 1.13982 |
| 1.535660817 | 0.74373626 | 241 | 1.14213 |
| 1.540637426 | 0.74282314 | 242 | 1.14442 |
| 1.545604263 | 0.741911141 | 243 | 1.14670 |
| 1.550561347 | 0.741000262 | 244 | 1.14897 |
| 1.555508697 | 0.740090501 | 245 | 1.15122 |
| 1.560446332 | 0.739181858 | 246 | 1.15345 |
| 1.565374271 | 0.738274329 | 247 | 1.15568 |
| 1.570292533 | 0.737367915 | 248 | 1.15788 |
| 1.575201137 | 0.736462614 | 249 | 1.16008 |
| 1.580100102 | 0.735558424 | 250 | 1.16226 |
| 1.584989447 | 0.734655345 | 251 | 1.16442 |
| 1.589869192 | 0.733753374 | 252 | 1.16657 |
| 1.594739354 | 0.732852511 | 253 | 1.16871 |
| 1.599599952 | 0.731952753 | 254 | 1.17083 |
| 1.604451006 | 0.7310541 | 255 | 1.17294 |
| 1.609292534 | 0.730156551 | 256 | 1.17504 |
| 1.614124555 | 0.729260103 | 257 | 1.17712 |
| 1.618947088 | 0.728364757 | 258 | 1.17918 |
| 1.62376015 | 0.727470509 | 259 | 1.18124 |
| 1.628563762 | 0.726577359 | 260 | 1.18328 |
| 1.63335794 | 0.725685306 | 261 | 1.18530 |
| 1.638142705 | 0.724794348 | 262 | 1.18732 |
| 1.642918073 | 0.723904484 | 263 | 1.18932 |
| 1.647684065 | 0.723015713 | 264 | 1.19130 |
| 1.652440697 | 0.722128032 | 265 | 1.19327 |
| 1.65718799 | 0.721241442 | 266 | 1.19523 |
| 1.66192596 | 0.72035594 | 267 | 1.19718 |
| 1.666654626 | 0.719471525 | 268 | 1.19911 |
| 1.671374006 | 0.718588196 | 269 | 1.20103 |
| 1.67608412 | 0.717705952 | 270 | 1.20294 |
| 1.680784984 | 0.716824791 | 271 | 1.20483 |
| 1.685476617 | 0.715944711 | 272 | 1.20671 |
| 1.690159038 | 0.715065712 | 273 | 1.20857 |
| 1.694832264 | 0.714187792 | 274 | 1.21043 |
| 1.699496313 | 0.713310951 | 275 | 1.21227 |
| 1.704151203 | 0.712435185 | 276 | 1.21410 |
| 1.708796953 | 0.711560495 | 277 | 1.21591 |
| 1.71343358 | 0.710686879 | 278 | 1.21771 |
| 1.718061102 | 0.709814335 | 279 | 1.21950 |
| 1.722679537 | 0.708942863 | 280 | 1.22128 |
| 1.727288903 | 0.70807246 | 281 | 1.22305 |
| 1.731889218 | 0.707203127 | 282 | 1.22480 |
| 1.736480499 | 0.70633486 | 283 | 1.22654 |
| 1.741062765 | 0.70546766 | 284 | 1.22826 |
| 1.745636032 | 0.704601524 | 285 | 1.22998 |
| 1.75020032 | 0.703736452 | 286 | 1.23168 |
| 1.754755644 | 0.702872441 | 287 | 1.23337 |
| 1.759302023 | 0.702009492 | 288 | 1.23505 |
| 1.763839475 | 0.701147602 | 289 | 1.23671 |
| 1.768368016 | 0.70028677 | 290 | 1.23836 |
| 1.772887665 | 0.699426995 | 291 | 1.24001 |
| 1.777398439 | 0.698568276 | 292 | 1.24163 |
| 1.781900355 | 0.697710611 | 293 | 1.24325 |
| 1.786393431 | 0.696853999 | 294 | 1.24486 |
| 1.790877684 | 0.695998438 | 295 | 1.24645 |
| 1.795353132 | 0.695143928 | 296 | 1.24803 |
| 1.799819791 | 0.694290468 | 297 | 1.24960 |
| 1.804277679 | 0.693438055 | 298 | 1.25115 |
| 1.808726813 | 0.692586688 | 299 | 1.25270 |
| 1.813167211 | 0.691736367 | 300 | 1.25423 |
| 1.817598889 | 0.69088709 | 301 | 1.25576 |
| 1.822021864 | 0.690038855 | 302 | 1.25727 |
| 1.826436155 | 0.689191662 | 303 | 1.25876 |
| 1.830841777 | 0.688345509 | 304 | 1.26025 |
| 1.835238748 | 0.687500395 | 305 | 1.26173 |
| 1.839627085 | 0.686656319 | 306 | 1.26319 |
| 1.844006805 | 0.685813278 | 307 | 1.26464 |
| 1.848377924 | 0.684971273 | 308 | 1.26609 |
| 1.85274046 | 0.684130302 | 309 | 1.26752 |
| 1.857094429 | 0.683290363 | 310 | 1.26893 |
| 1.861439848 | 0.682451455 | 311 | 1.27034 |
| 1.865776735 | 0.681613578 | 312 | 1.27174 |
| 1.870105105 | 0.680776729 | 313 | 1.27312 |
| 1.874424976 | 0.679940907 | 314 | 1.27450 |
| 1.878736364 | 0.679106112 | 315 | 1.27586 |
| 1.883039286 | 0.678272341 | 316 | 1.27721 |
| 1.887333758 | 0.677439595 | 317 | 1.27855 |
| 1.891619797 | 0.67660787 | 318 | 1.27988 |
| 1.89589742 | 0.675777167 | 319 | 1.28120 |
| 1.900166643 | 0.674947484 | 320 | 1.28251 |
| 1.904427483 | 0.674118819 | 321 | 1.28381 |
| 1.908679956 | 0.673291172 | 322 | 1.28510 |
| 1.912924078 | 0.67246454 | 323 | 1.28637 |
| 1.917159867 | 0.671638924 | 324 | 1.28764 |
| 1.921387337 | 0.670814322 | 325 | 1.28889 |
| 1.925606507 | 0.669990731 | 326 | 1.29014 |
| 1.929817391 | 0.669168152 | 327 | 1.29137 |
| 1.934020006 | 0.668346583 | 328 | 1.29260 |
| 1.938214369 | 0.667526023 | 329 | 1.29381 |
| 1.942400496 | 0.66670647 | 330 | 1.29501 |
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| 2.98158329 | 0.438531197 | 671 | 1.30752 |
| 2.983720583 | 0.437992792 | 672 | 1.30685 |
| 2.985853679 | 0.437455048 | 673 | 1.30618 |
| 2.987982586 | 0.436917964 | 674 | 1.30550 |
| 2.990107313 | 0.436381539 | 675 | 1.30483 |
| 2.992227867 | 0.435845773 | 676 | 1.30415 |
| 2.994344257 | 0.435310664 | 677 | 1.30347 |
| 2.996456492 | 0.434776213 | 678 | 1.30279 |
| 2.998564579 | 0.434242418 | 679 | 1.30210 |
| 3.000668526 | 0.433709278 | 680 | 1.30142 |
| 3.002768341 | 0.433176793 | 681 | 1.30073 |
| 3.004864034 | 0.432644961 | 682 | 1.30004 |
| 3.006955611 | 0.432113783 | 683 | 1.29935 |
| 3.009043081 | 0.431583257 | 684 | 1.29865 |
| 3.011126451 | 0.431053382 | 685 | 1.29796 |
| 3.013205731 | 0.430524157 | 686 | 1.29726 |
| 3.015280928 | 0.429995582 | 687 | 1.29656 |
| 3.01735205 | 0.429467657 | 688 | 1.29586 |
| 3.019419104 | 0.428940379 | 689 | 1.29515 |
| 3.0214821 | 0.428413749 | 690 | 1.29444 |
| 3.023541045 | 0.427887765 | 691 | 1.29374 |
| 3.025595946 | 0.427362427 | 692 | 1.29303 |
| 3.027646813 | 0.426837734 | 693 | 1.29231 |
| 3.029693652 | 0.426313686 | 694 | 1.29160 |
| 3.031736472 | 0.42579028 | 695 | 1.29088 |
| 3.03377528 | 0.425267518 | 696 | 1.29017 |
| 3.035810085 | 0.424745397 | 697 | 1.28945 |
| 3.037840894 | 0.424223917 | 698 | 1.28872 |
| 3.039867716 | 0.423703077 | 699 | 1.28800 |
| 3.041890557 | 0.423182877 | 700 | 1.28728 |
| 3.043909426 | 0.422663316 | 701 | 1.28655 |
| 3.045924331 | 0.422144392 | 702 | 1.28582 |
| 3.047935279 | 0.421626105 | 703 | 1.28509 |
| 3.049942278 | 0.421108455 | 704 | 1.28436 |
| 3.051945336 | 0.420591441 | 705 | 1.28362 |
| 3.053944461 | 0.420075061 | 706 | 1.28289 |
| 3.055939661 | 0.419559315 | 707 | 1.28215 |
| 3.057930942 | 0.419044202 | 708 | 1.28141 |
| 3.059918313 | 0.418529722 | 709 | 1.28067 |
| 3.061901782 | 0.418015874 | 710 | 1.27992 |
| 3.063881355 | 0.417502656 | 711 | 1.27918 |
| 3.065857042 | 0.416990068 | 712 | 1.27843 |
| 3.067828848 | 0.41647811 | 713 | 1.27768 |
| 3.069796783 | 0.41596678 | 714 | 1.27693 |
| 3.071760854 | 0.415456078 | 715 | 1.27618 |
| 3.073721068 | 0.414946003 | 716 | 1.27543 |
| 3.075677432 | 0.414436555 | 717 | 1.27467 |
| 3.077629955 | 0.413927731 | 718 | 1.27392 |
| 3.079578644 | 0.413419533 | 719 | 1.27316 |
| 3.081523506 | 0.412911958 | 720 | 1.27240 |
| 3.083464549 | 0.412405007 | 721 | 1.27164 |
| 3.08540178 | 0.411898678 | 722 | 1.27087 |
| 3.087335208 | 0.411392971 | 723 | 1.27011 |
| 3.089264838 | 0.410887884 | 724 | 1.26934 |
| 3.09119068 | 0.410383418 | 725 | 1.26857 |
| 3.09311274 | 0.409879571 | 726 | 1.26780 |
| 3.095031026 | 0.409376343 | 727 | 1.26703 |
| 3.096945544 | 0.408873732 | 728 | 1.26626 |
| 3.098856303 | 0.408371739 | 729 | 1.26549 |
| 3.100763311 | 0.407870361 | 730 | 1.26471 |
| 3.102666573 | 0.4073696 | 731 | 1.26393 |
| 3.104566098 | 0.406869453 | 732 | 1.26315 |
| 3.106461893 | 0.40636992 | 733 | 1.26237 |
| 3.108353965 | 0.405871001 | 734 | 1.26159 |
| 3.110242322 | 0.405372694 | 735 | 1.26081 |
| 3.112126971 | 0.404874999 | 736 | 1.26002 |
| 3.114007919 | 0.404377915 | 737 | 1.25924 |
| 3.115885173 | 0.403881441 | 738 | 1.25845 |
| 3.117758741 | 0.403385577 | 739 | 1.25766 |
| 3.11962863 | 0.402890322 | 740 | 1.25687 |
| 3.121494847 | 0.402395674 | 741 | 1.25608 |
| 3.1233574 | 0.401901634 | 742 | 1.25528 |
| 3.125216295 | 0.401408201 | 743 | 1.25449 |
| 3.127071539 | 0.400915373 | 744 | 1.25369 |
| 3.128923141 | 0.40042315 | 745 | 1.25289 |
| 3.130771107 | 0.399931532 | 746 | 1.25209 |
| 3.132615444 | 0.399440517 | 747 | 1.25129 |
| 3.134456159 | 0.398950105 | 748 | 1.25049 |
| 3.13629326 | 0.398460296 | 749 | 1.24969 |
| 3.138126753 | 0.397971087 | 750 | 1.24888 |
| 3.139956646 | 0.397482479 | 751 | 1.24808 |
| 3.141782946 | 0.396994472 | 752 | 1.24727 |
| 3.143605659 | 0.396507063 | 753 | 1.24646 |
| 3.145424793 | 0.396020253 | 754 | 1.24565 |
| 3.147240355 | 0.39553404 | 755 | 1.24484 |
| 3.149052352 | 0.395048424 | 756 | 1.24403 |
| 3.15086079 | 0.394563405 | 757 | 1.24321 |
| 3.152665678 | 0.394078981 | 758 | 1.24240 |
| 3.154467021 | 0.393595151 | 759 | 1.24158 |
| 3.156264827 | 0.393111916 | 760 | 1.24077 |
| 3.158059102 | 0.392629274 | 761 | 1.23995 |
| 3.159849855 | 0.392147225 | 762 | 1.23913 |
| 3.161637091 | 0.391665767 | 763 | 1.23831 |
| 3.163420817 | 0.391184901 | 764 | 1.23748 |
| 3.165201041 | 0.390704625 | 765 | 1.23666 |
| 3.166977768 | 0.390224938 | 766 | 1.23583 |
| 3.168751007 | 0.389745841 | 767 | 1.23501 |
| 3.170520764 | 0.389267332 | 768 | 1.23418 |
| 3.172287046 | 0.38878941 | 769 | 1.23335 |
| 3.174049859 | 0.388312075 | 770 | 1.23252 |
| 3.175809211 | 0.387835326 | 771 | 1.23169 |
| 3.177565108 | 0.387359162 | 772 | 1.23086 |
| 3.179317557 | 0.386883583 | 773 | 1.23003 |
| 3.181066564 | 0.386408588 | 774 | 1.22919 |
| 3.182812138 | 0.385934176 | 775 | 1.22836 |
| 3.184554283 | 0.385460347 | 776 | 1.22752 |
| 3.186293008 | 0.384987099 | 777 | 1.22668 |
| 3.188028318 | 0.384514432 | 778 | 1.22584 |
| 3.18976022 | 0.384042346 | 779 | 1.22500 |
| 3.191488722 | 0.383570839 | 780 | 1.22416 |
| 3.19321383 | 0.383099911 | 781 | 1.22332 |
| 3.19493555 | 0.382629561 | 782 | 1.22248 |
| 3.196653889 | 0.382159789 | 783 | 1.22163 |
| 3.198368853 | 0.381690594 | 784 | 1.22079 |
| 3.200080451 | 0.381221974 | 785 | 1.21994 |
| 3.201788687 | 0.38075393 | 786 | 1.21909 |
| 3.203493569 | 0.380286461 | 787 | 1.21825 |
| 3.205195102 | 0.379819565 | 788 | 1.21740 |
| 3.206893295 | 0.379353243 | 789 | 1.21655 |
| 3.208588153 | 0.378887493 | 790 | 1.21569 |
| 3.210279683 | 0.378422315 | 791 | 1.21484 |
| 3.211967891 | 0.377957708 | 792 | 1.21399 |
| 3.213652784 | 0.377493672 | 793 | 1.21313 |
| 3.215334369 | 0.377030205 | 794 | 1.21228 |
| 3.217012651 | 0.376567307 | 795 | 1.21142 |
| 3.218687638 | 0.376104978 | 796 | 1.21056 |
| 3.220359336 | 0.375643216 | 797 | 1.20971 |
| 3.222027751 | 0.375182021 | 798 | 1.20885 |
| 3.22369289 | 0.374721393 | 799 | 1.20799 |
| 3.225354759 | 0.37426133 | 800 | 1.20713 |
| 3.227013365 | 0.373801832 | 801 | 1.20626 |
| 3.228668714 | 0.373342898 | 802 | 1.20540 |
| 3.230320812 | 0.372884527 | 803 | 1.20454 |
| 3.231969666 | 0.372426719 | 804 | 1.20367 |
| 3.233615282 | 0.371969473 | 805 | 1.20281 |
| 3.235257667 | 0.371512789 | 806 | 1.20194 |
| 3.236896827 | 0.371056665 | 807 | 1.20107 |
| 3.238532767 | 0.370601102 | 808 | 1.20020 |
| 3.240165496 | 0.370146097 | 809 | 1.19933 |
| 3.241795018 | 0.369691652 | 810 | 1.19846 |
| 3.243421341 | 0.369237764 | 811 | 1.19759 |
| 3.24504447 | 0.368784433 | 812 | 1.19672 |
| 3.246664411 | 0.368331659 | 813 | 1.19585 |
| 3.248281172 | 0.367879441 | 814 | 1.19498 |
| 3.249894758 | 0.367427778 | 815 | 1.19410 |
| 3.251505175 | 0.36697667 | 816 | 1.19323 |
| 3.25311243 | 0.366526116 | 817 | 1.19235 |
| 3.254716528 | 0.366076114 | 818 | 1.19147 |
| 3.256317477 | 0.365626665 | 819 | 1.19060 |
| 3.257915282 | 0.365177768 | 820 | 1.18972 |
| 3.25950995 | 0.364729422 | 821 | 1.18884 |
| 3.261101486 | 0.364281627 | 822 | 1.18796 |
| 3.262689897 | 0.363834381 | 823 | 1.18708 |
| 3.264275189 | 0.363387685 | 824 | 1.18620 |
| 3.265857368 | 0.362941537 | 825 | 1.18532 |
| 3.26743644 | 0.362495936 | 826 | 1.18443 |
| 3.269012411 | 0.362050883 | 827 | 1.18355 |
| 3.270585287 | 0.361606376 | 828 | 1.18266 |
| 3.272155075 | 0.361162415 | 829 | 1.18178 |
| 3.27372178 | 0.360718999 | 830 | 1.18089 |
| 3.275285409 | 0.360276127 | 831 | 1.18001 |
| 3.276845967 | 0.3598338 | 832 | 1.17912 |
| 3.278403461 | 0.359392015 | 833 | 1.17823 |
| 3.279957897 | 0.358950772 | 834 | 1.17734 |
| 3.28150928 | 0.358510072 | 835 | 1.17645 |
| 3.283057617 | 0.358069912 | 836 | 1.17556 |
| 3.284602913 | 0.357630293 | 837 | 1.17467 |
| 3.286145175 | 0.357191213 | 838 | 1.17378 |
| 3.287684408 | 0.356752673 | 839 | 1.17289 |
| 3.289220619 | 0.356314671 | 840 | 1.17200 |
| 3.290753813 | 0.355877207 | 841 | 1.17110 |
| 3.292283997 | 0.355440279 | 842 | 1.17021 |
| 3.293811175 | 0.355003889 | 843 | 1.16932 |
| 3.295335355 | 0.354568034 | 844 | 1.16842 |
| 3.296856542 | 0.354132714 | 845 | 1.16752 |
| 3.298374742 | 0.353697929 | 846 | 1.16663 |
| 3.29988996 | 0.353263677 | 847 | 1.16573 |
| 3.301402203 | 0.352829959 | 848 | 1.16483 |
| 3.302911477 | 0.352396773 | 849 | 1.16394 |
| 3.304417787 | 0.351964119 | 850 | 1.16304 |
| 3.305921138 | 0.351531996 | 851 | 1.16214 |
| 3.307421538 | 0.351100403 | 852 | 1.16124 |
| 3.308918992 | 0.350669341 | 853 | 1.16034 |
| 3.310413505 | 0.350238808 | 854 | 1.15944 |
| 3.311905083 | 0.349808803 | 855 | 1.15853 |
| 3.313393733 | 0.349379327 | 856 | 1.15763 |
| 3.314879459 | 0.348950377 | 857 | 1.15673 |
| 3.316362267 | 0.348521954 | 858 | 1.15583 |
| 3.317842164 | 0.348094058 | 859 | 1.15492 |
| 3.319319155 | 0.347666686 | 860 | 1.15402 |
| 3.320793246 | 0.347239839 | 861 | 1.15311 |
| 3.322264441 | 0.346813517 | 862 | 1.15221 |
| 3.323732748 | 0.346387718 | 863 | 1.15130 |
| 3.325198172 | 0.345962441 | 864 | 1.15039 |
| 3.326660718 | 0.345537687 | 865 | 1.14949 |
| 3.328120392 | 0.345113454 | 866 | 1.14858 |
| 3.3295772 | 0.344689742 | 867 | 1.14767 |
| 3.331031147 | 0.34426655 | 868 | 1.14676 |
| 3.332482239 | 0.343843878 | 869 | 1.14585 |
| 3.333930482 | 0.343421725 | 870 | 1.14494 |
| 3.33537588 | 0.34300009 | 871 | 1.14403 |
| 3.336818441 | 0.342578972 | 872 | 1.14312 |
| 3.338258169 | 0.342158372 | 873 | 1.14221 |
| 3.339695069 | 0.341738288 | 874 | 1.14130 |
| 3.341129148 | 0.34131872 | 875 | 1.14039 |
| 3.342560411 | 0.340899667 | 876 | 1.13948 |
| 3.343988863 | 0.340481129 | 877 | 1.13857 |
| 3.345414511 | 0.340063104 | 878 | 1.13765 |
| 3.346837358 | 0.339645593 | 879 | 1.13674 |
| 3.348257412 | 0.339228594 | 880 | 1.13582 |
| 3.349674678 | 0.338812107 | 881 | 1.13491 |
| 3.35108916 | 0.338396131 | 882 | 1.13400 |
| 3.352500864 | 0.337980667 | 883 | 1.13308 |
| 3.353909797 | 0.337565712 | 884 | 1.13216 |
| 3.355315963 | 0.337151267 | 885 | 1.13125 |
| 3.356719368 | 0.33673733 | 886 | 1.13033 |
| 3.358120016 | 0.336323902 | 887 | 1.12942 |
| 3.359517915 | 0.335910981 | 888 | 1.12850 |
| 3.360913068 | 0.335498568 | 889 | 1.12758 |
| 3.362305482 | 0.33508666 | 890 | 1.12666 |
| 3.363695161 | 0.334675259 | 891 | 1.12575 |
| 3.365082112 | 0.334264362 | 892 | 1.12483 |
| 3.366466339 | 0.33385397 | 893 | 1.12391 |
| 3.367847848 | 0.333444082 | 894 | 1.12299 |
| 3.369226644 | 0.333034697 | 895 | 1.12207 |
| 3.370602733 | 0.332625815 | 896 | 1.12115 |
| 3.371976119 | 0.332217434 | 897 | 1.12023 |
| 3.373346809 | 0.331809555 | 898 | 1.11931 |
| 3.374714807 | 0.331402177 | 899 | 1.11839 |
| 3.376080118 | 0.330995299 | 900 | 1.11747 |
| 3.377442749 | 0.330588921 | 901 | 1.11655 |
| 3.378802704 | 0.330183041 | 902 | 1.11562 |
| 3.380159988 | 0.32977766 | 903 | 1.11470 |
| 3.381514607 | 0.329372776 | 904 | 1.11378 |
| 3.382866567 | 0.32896839 | 905 | 1.11286 |
| 3.384215871 | 0.3285645 | 906 | 1.11193 |
| 3.385562526 | 0.328161106 | 907 | 1.11101 |
| 3.386906536 | 0.327758207 | 908 | 1.11009 |
| 3.388247907 | 0.327355803 | 909 | 1.10916 |
| 3.389586644 | 0.326953893 | 910 | 1.10824 |
| 3.390922752 | 0.326552476 | 911 | 1.10731 |
| 3.392256237 | 0.326151553 | 912 | 1.10639 |
| 3.393587103 | 0.325751121 | 913 | 1.10546 |
| 3.394915356 | 0.325351181 | 914 | 1.10454 |
| 3.396241 | 0.324951732 | 915 | 1.10361 |
| 3.397564041 | 0.324552774 | 916 | 1.10269 |
| 3.398884485 | 0.324154305 | 917 | 1.10176 |
| 3.400202335 | 0.323756326 | 918 | 1.10084 |
| 3.401517598 | 0.323358835 | 919 | 1.09991 |
| 3.402830277 | 0.322961832 | 920 | 1.09898 |
| 3.40414038 | 0.322565317 | 921 | 1.09806 |
| 3.405447909 | 0.322169288 | 922 | 1.09713 |
| 3.406752871 | 0.321773746 | 923 | 1.09620 |
| 3.408055271 | 0.321378689 | 924 | 1.09528 |
| 3.409355112 | 0.320984117 | 925 | 1.09435 |
| 3.410652402 | 0.32059003 | 926 | 1.09342 |
| 3.411947144 | 0.320196426 | 927 | 1.09249 |
| 3.413239344 | 0.319803306 | 928 | 1.09157 |
| 3.414529006 | 0.319410669 | 929 | 1.09064 |
| 3.415816135 | 0.319018513 | 930 | 1.08971 |
| 3.417100738 | 0.318626839 | 931 | 1.08878 |
| 3.418382817 | 0.318235646 | 932 | 1.08785 |
| 3.419662379 | 0.317844933 | 933 | 1.08692 |
| 3.420939429 | 0.3174547 | 934 | 1.08599 |
| 3.42221397 | 0.317064946 | 935 | 1.08506 |
| 3.423486009 | 0.316675671 | 936 | 1.08413 |
| 3.42475555 | 0.316286873 | 937 | 1.08321 |
| 3.426022598 | 0.315898553 | 938 | 1.08228 |
| 3.427287158 | 0.315510709 | 939 | 1.08135 |
| 3.428549235 | 0.315123342 | 940 | 1.08042 |
| 3.429808834 | 0.31473645 | 941 | 1.07949 |
| 3.431065959 | 0.314350034 | 942 | 1.07856 |
| 3.432320616 | 0.313964091 | 943 | 1.07763 |
| 3.433572808 | 0.313578623 | 944 | 1.07670 |
| 3.434822542 | 0.313193628 | 945 | 1.07576 |
| 3.436069822 | 0.312809105 | 946 | 1.07483 |
| 3.437314653 | 0.312425055 | 947 | 1.07390 |
| 3.438557039 | 0.312041476 | 948 | 1.07297 |
| 3.439796985 | 0.311658368 | 949 | 1.07204 |
| 3.441034497 | 0.31127573 | 950 | 1.07111 |
| 3.442269579 | 0.310893562 | 951 | 1.07018 |
| 3.443502235 | 0.310511864 | 952 | 1.06925 |
| 3.444732471 | 0.310130634 | 953 | 1.06832 |
| 3.445960291 | 0.309749872 | 954 | 1.06739 |
| 3.4471857 | 0.309369577 | 955 | 1.06645 |
| 3.448408702 | 0.30898975 | 956 | 1.06552 |
| 3.449629303 | 0.308610389 | 957 | 1.06459 |
| 3.450847507 | 0.308231493 | 958 | 1.06366 |
| 3.45206332 | 0.307853063 | 959 | 1.06273 |
| 3.453276744 | 0.307475097 | 960 | 1.06180 |
| 3.454487786 | 0.307097596 | 961 | 1.06086 |
| 3.45569645 | 0.306720558 | 962 | 1.05993 |
| 3.45690274 | 0.306343982 | 963 | 1.05900 |
| 3.458106662 | 0.305967869 | 964 | 1.05807 |
| 3.459308219 | 0.305592218 | 965 | 1.05714 |
| 3.460507417 | 0.305217028 | 966 | 1.05621 |
| 3.46170426 | 0.304842299 | 967 | 1.05527 |
| 3.462898753 | 0.30446803 | 968 | 1.05434 |
| 3.464090901 | 0.30409422 | 969 | 1.05341 |
| 3.465280707 | 0.30372087 | 970 | 1.05248 |
| 3.466468177 | 0.303347977 | 971 | 1.05155 |
| 3.467653315 | 0.302975543 | 972 | 1.05061 |
| 3.468836126 | 0.302603565 | 973 | 1.04968 |
| 3.470016615 | 0.302232045 | 974 | 1.04875 |
| 3.471194785 | 0.30186098 | 975 | 1.04782 |
| 3.472370641 | 0.301490371 | 976 | 1.04689 |
| 3.473544189 | 0.301120218 | 977 | 1.04595 |
| 3.474715432 | 0.300750518 | 978 | 1.04502 |
| 3.475884376 | 0.300381273 | 979 | 1.04409 |
| 3.477051024 | 0.30001248 | 980 | 1.04316 |
| 3.478215381 | 0.299644141 | 981 | 1.04223 |
| 3.479377451 | 0.299276254 | 982 | 1.04130 |
| 3.48053724 | 0.298908818 | 983 | 1.04036 |
| 3.481694751 | 0.298541834 | 984 | 1.03943 |
| 3.482849989 | 0.2981753 | 985 | 1.03850 |
| 3.484002959 | 0.297809216 | 986 | 1.03757 |
| 3.485153664 | 0.297443582 | 987 | 1.03664 |
| 3.486302111 | 0.297078396 | 988 | 1.03571 |
| 3.487448301 | 0.296713659 | 989 | 1.03477 |
| 3.488592242 | 0.29634937 | 990 | 1.03384 |
| 3.489733935 | 0.295985528 | 991 | 1.03291 |
| 3.490873387 | 0.295622133 | 992 | 1.03198 |
| 3.492010602 | 0.295259184 | 993 | 1.03105 |
| 3.493145583 | 0.29489668 | 994 | 1.03012 |
| 3.494278335 | 0.294534622 | 995 | 1.02919 |
| 3.495408864 | 0.294173008 | 996 | 1.02825 |
| 3.496537172 | 0.293811838 | 997 | 1.02732 |
| 3.497663264 | 0.293451111 | 998 | 1.02639 |
| 3.498787146 | 0.293090827 | 999 | 1.02546 |
| 3.49990882 | 0.292730986 | 1000 | 1.02453 |
|  |  |  |  |

**Appendix 1.3: Productivity as a Function of Depth**

|  |  |  |
| --- | --- | --- |
| **Depth (z)** | **PAR Irradiance** | **Productivity (Hourly)** |
| 0 | 730.00 | 1.264709452 |
| -1 | 694.40 | 1.291599867 |
| -2 | 660.53 | 1.314731954 |
| -3 | 628.32 | 1.33406481 |
| -4 | 597.67 | 1.350111749 |
| -5 | 568.52 | 1.36232927 |
| -6 | 540.80 | 1.371166499 |
| -7 | 514.42 | 1.376405264 |
| -8 | 489.33 | 1.378401213 |
| -9 | 465.47 | 1.377179432 |
| -10 | 442.77 | 1.37280399 |
| -11 | 421.17 | 1.365789391 |
| -12 | 400.63 | 1.355615777 |
| -13 | 381.09 | 1.343448329 |
| -14 | 362.51 | 1.3282292 |
| -15 | 344.83 | 1.310774233 |
| -16 | 328.01 | 1.292595663 |
| -17 | 312.01 | 1.271738755 |
| -18 | 296.80 | 1.248028829 |
| -19 | 282.32 | 1.22479747 |
| -20 | 268.55 | 1.199110546 |
| -21 | 255.45 | 1.172940487 |
| -22 | 243.00 | 1.144421131 |
| -23 | 231.14 | 1.118365969 |
| -24 | 219.87 | 1.087837548 |
| -25 | 209.15 | 1.060648365 |
| -26 | 198.95 | 1.028826348 |
| -27 | 189.25 | 1.001241803 |
| -28 | 180.02 | 0.97221251 |
| -29 | 171.24 | 0.941689214 |
| -30 | 162.89 | 0.909621148 |
| -31 | 154.94 | 0.879777086 |
| -32 | 147.38 | 0.852598689 |
| -33 | 140.20 | 0.824399244 |
| -34 | 133.36 | 0.795152153 |
| -35 | 126.85 | 0.764830186 |
| -36 | 120.67 | 0.737963304 |
| -37 | 114.78 | 0.710268308 |
| -38 | 109.19 | 0.686543364 |
| -39 | 103.86 | 0.657282353 |
| -40 | 98.79 | 0.632226051 |
| -41 | 93.98 | 0.606546796 |
| -42 | 89.39 | 0.585547224 |
| -43 | 85.03 | 0.564135766 |
| -44 | 80.89 | 0.536783087 |
| -45 | 76.94 | 0.514422843 |
| -46 | 73.19 | 0.49736972 |
| -47 | 69.62 | 0.474249956 |
| -48 | 66.22 | 0.456619975 |
| -49 | 62.99 | 0.432721326 |
| -50 | 59.92 | 0.414499793 |
| -51 | 57.00 | 0.396020153 |
| -52 | 54.22 | 0.383555623 |
| -53 | 51.58 | 0.364639591 |
| -54 | 49.06 | 0.351881518 |
| -55 | 46.67 | 0.332521212 |
| -56 | 44.39 | 0.319464297 |
| -57 | 42.23 | 0.306286343 |
| -58 | 40.17 | 0.292986481 |
| -59 | 38.21 | 0.279563838 |
| -60 | 36.34 | 0.266017534 |
| -61 | 34.57 | 0.252346686 |
| -62 | 32.89 | 0.238550401 |
| -63 | 31.28 | 0.23160494 |
| -64 | 29.76 | 0.217618818 |
| -65 | 28.31 | 0.21057793 |
| -66 | 26.92 | 0.196399931 |
| -67 | 25.61 | 0.189262591 |
| -68 | 24.36 | 0.182092872 |
| -69 | 23.17 | 0.174890658 |
| -70 | 22.04 | 0.167655832 |
| -71 | 20.97 | 0.153087884 |
| -72 | 19.95 | 0.145754528 |
| -73 | 18.97 | 0.138388095 |
| -74 | 18.05 | 0.138388095 |
| -75 | 17.17 | 0.130988466 |
| -76 | 16.33 | 0.123555524 |
| -77 | 15.53 | 0.11608915 |
| -78 | 14.78 | 0.108589226 |
| -79 | 14.06 | 0.108589226 |
| -80 | 13.37 | 0.101055632 |
| -81 | 12.72 | 0.093488249 |
| -82 | 12.10 | 0.093488249 |
| -83 | 11.51 | 0.085886956 |
| -84 | 10.95 | 0.078251634 |
| -85 | 10.41 | 0.078251634 |
| -86 | 9.91 | 0.070582161 |
| -87 | 9.42 | 0.070582161 |
| -88 | 8.96 | 0.062878417 |
| -89 | 8.53 | 0.062878417 |
| -90 | 8.11 | 0.062878417 |
| -91 | 7.71 | 0.055140279 |
| -92 | 7.34 | 0.055140279 |
| -93 | 6.98 | 0.047367626 |
| -94 | 6.64 | 0.047367626 |
| -95 | 6.32 | 0.047367626 |
| -96 | 6.01 | 0.047367626 |
| -97 | 5.71 | 0.039560335 |
| -98 | 5.44 | 0.039560335 |
| -99 | 5.17 | 0.039560335 |
| -100 | 4.92 | 0.031718283 |
| -101 | 4.68 | 0.031718283 |
| -102 | 4.45 | 0.031718283 |
| -103 | 4.23 | 0.031718283 |
| -104 | 4.03 | 0.031718283 |
| -105 | 3.83 | 0.023841348 |
| -106 | 3.64 | 0.023841348 |
| -107 | 3.47 | 0.023841348 |
| -108 | 3.30 | 0.023841348 |
| -109 | 3.14 | 0.023841348 |
| -110 | 2.98 | 0.015929405 |
| -111 | 2.84 | 0.015929405 |
| -112 | 2.70 | 0.015929405 |
| -113 | 2.57 | 0.015929405 |
| -114 | 2.44 | 0.015929405 |
| -115 | 2.32 | 0.015929405 |
| -116 | 2.21 | 0.015929405 |
| -117 | 2.10 | 0.015929405 |
| -118 | 2.00 | 0.00798233 |
| -119 | 1.90 | 0.00798233 |
| -120 | 1.81 | 0.00798233 |
| -121 | 1.72 | 0.00798233 |
| -122 | 1.64 | 0.00798233 |
| -123 | 1.56 | 0.00798233 |
| -124 | 1.48 | 0.00798233 |
| -125 | 1.41 | 0.00798233 |
| -126 | 1.34 | 0.00798233 |
| -127 | 1.28 | 0.00798233 |
| -128 | 1.21 | 0.00798233 |
| -129 | 1.15 | 0.00798233 |
| -130 | 1.10 | 0.00798233 |
| -131 | 1.04 | 0.00798233 |
| -132 | 0.99 | 0 |
| -133 | 0.94 | 0 |
| -134 | 0.90 | 0 |
| -135 | 0.85 | 0 |
| -136 | 0.81 | 0 |
| -137 | 0.77 | 0 |
| -138 | 0.74 | 0 |
| -139 | 0.70 | 0 |
| -140 | 0.67 | 0 |
| -141 | 0.63 | 0 |
| -142 | 0.60 | 0 |
| -143 | 0.57 | 0 |
| -144 | 0.55 | 0 |
| -145 | 0.52 | 0 |
| -146 | 0.49 | 0 |
| -147 | 0.47 | 0 |
| -148 | 0.45 | 0 |
| -149 | 0.42 | 0 |
| -150 | 0.40 | 0 |
| -151 | 0.38 | 0 |
| -152 | 0.37 | 0 |
| -153 | 0.35 | 0 |
| -154 | 0.33 | 0 |
| -155 | 0.31 | 0 |
| -156 | 0.30 | 0 |
| -157 | 0.28 | 0 |
| -158 | 0.27 | 0 |
| -159 | 0.26 | 0 |
| -160 | 0.24 | 0 |
| -161 | 0.23 | 0 |
| -162 | 0.22 | 0 |
| -163 | 0.21 | 0 |
| -164 | 0.20 | 0 |
| -165 | 0.19 | 0 |
| -166 | 0.18 | 0 |
| -167 | 0.17 | 0 |
| -168 | 0.16 | 0 |
| -169 | 0.16 | 0 |
| -170 | 0.15 | 0 |
| -171 | 0.14 | 0 |
| -172 | 0.13 | 0 |
| -173 | 0.13 | 0 |
| -174 | 0.12 | 0 |
| -175 | 0.12 | 0 |
| -176 | 0.11 | 0 |
| -177 | 0.10 | 0 |
| -178 | 0.10 | 0 |
| -179 | 0.09 | 0 |
| -180 | 0.09 | 0 |
| -181 | 0.09 | 0 |
| -182 | 0.08 | 0 |
| -183 | 0.08 | 0 |
| -184 | 0.07 | 0 |
| -185 | 0.07 | 0 |
| -186 | 0.07 | 0 |
| -187 | 0.06 | 0 |
| -188 | 0.06 | 0 |
| -189 | 0.06 | 0 |
| -190 | 0.05 | 0 |
| -191 | 0.05 | 0 |
| -192 | 0.05 | 0 |
| -193 | 0.05 | 0 |
| -194 | 0.04 | 0 |
| -195 | 0.04 | 0 |
| -196 | 0.04 | 0 |
| -197 | 0.04 | 0 |
| -198 | 0.04 | 0 |
| -199 | 0.03 | 0 |
| -200 | 0.03 | 0 |

**Appendix 1.4:** Primary Productivity estimated with Trapezoidal Rule

|  |  |  |  |
| --- | --- | --- | --- |
| **Depth (z)** | **PAR Irradiance** | **Productivity (Hourly)** | **Primary Productivity calculated with Trapezoidal Rule** |
| 1.00 | 730.00 | 1.26 |  |
| 2.00 | 694.40 | 1.29 |  |
| 3.00 | 660.53 | 1.31 |  |
| 4.00 | 628.32 | 1.33 |  |
| 5.00 | 597.67 | 1.35 | 5.25 |
| 6.00 | 568.52 | 1.36 |  |
| 7.00 | 540.80 | 1.37 |  |
| 8.00 | 514.42 | 1.38 |  |
| 9.00 | 489.33 | 1.38 |  |
| 10.00 | 465.47 | 1.38 | 5.50 |
| 11.00 | 442.77 | 1.37 |  |
| 12.00 | 421.17 | 1.37 |  |
| 13.00 | 400.63 | 1.36 |  |
| 14.00 | 381.09 | 1.34 |  |
| 15.00 | 362.51 | 1.33 | 5.42 |
| 16.00 | 344.83 | 1.31 |  |
| 17.00 | 328.01 | 1.29 |  |
| 18.00 | 312.01 | 1.27 |  |
| 19.00 | 296.80 | 1.25 |  |
| 20.00 | 282.32 | 1.22 | 5.08 |
| 21.00 | 268.55 | 1.20 |  |
| 22.00 | 255.45 | 1.17 |  |
| 23.00 | 243.00 | 1.14 |  |
| 24.00 | 231.14 | 1.12 |  |
| 25.00 | 219.87 | 1.09 | 4.58 |
| 26.00 | 209.15 | 1.06 |  |
| 27.00 | 198.95 | 1.03 |  |
| 28.00 | 189.25 | 1.00 |  |
| 29.00 | 180.02 | 0.97 |  |
| 30.00 | 171.24 | 0.94 | 4.00 |
| 31.00 | 162.89 | 0.91 |  |
| 32.00 | 154.94 | 0.88 |  |
| 33.00 | 147.38 | 0.85 |  |
| 34.00 | 140.20 | 0.82 |  |
| 35.00 | 133.36 | 0.80 | 3.41 |
| 36.00 | 126.85 | 0.76 |  |
| 37.00 | 120.67 | 0.74 |  |
| 38.00 | 114.78 | 0.71 |  |
| 39.00 | 109.19 | 0.69 |  |
| 40.00 | 103.86 | 0.66 | 2.85 |
| 41.00 | 98.79 | 0.63 |  |
| 42.00 | 93.98 | 0.61 |  |
| 43.00 | 89.39 | 0.59 |  |
| 44.00 | 85.03 | 0.56 |  |
| 45.00 | 80.89 | 0.54 | 2.34 |
| 46.00 | 76.94 | 0.51 |  |
| 47.00 | 73.19 | 0.50 |  |
| 48.00 | 69.62 | 0.47 |  |
| 49.00 | 66.22 | 0.46 |  |
| 50.00 | 62.99 | 0.43 | 1.90 |
| 51.00 | 59.92 | 0.41 |  |
| 52.00 | 57.00 | 0.40 |  |
| 53.00 | 54.22 | 0.38 |  |
| 54.00 | 51.58 | 0.36 |  |
| 55.00 | 49.06 | 0.35 | 1.53 |
| 56.00 | 46.67 | 0.33 |  |
| 57.00 | 44.39 | 0.32 |  |
| 58.00 | 42.23 | 0.31 |  |
| 59.00 | 40.17 | 0.29 |  |
| 60.00 | 38.21 | 0.28 | 1.22 |
| 61.00 | 36.34 | 0.27 |  |
| 62.00 | 34.57 | 0.25 |  |
| 63.00 | 32.89 | 0.24 |  |
| 64.00 | 31.28 | 0.23 |  |
| 65.00 | 29.76 | 0.22 | 0.96 |
| 66.00 | 28.31 | 0.21 |  |
| 67.00 | 26.92 | 0.20 |  |
| 68.00 | 25.61 | 0.19 |  |
| 69.00 | 24.36 | 0.18 |  |
| 70.00 | 23.17 | 0.17 | 0.76 |
| 71.00 | 22.04 | 0.17 |  |
| 72.00 | 20.97 | 0.15 |  |
| 73.00 | 19.95 | 0.15 |  |
| 74.00 | 18.97 | 0.14 |  |
| 75.00 | 18.05 | 0.14 | 0.59 |
| 76.00 | 17.17 | 0.13 |  |
| 77.00 | 16.33 | 0.12 |  |
| 78.00 | 15.53 | 0.12 |  |
| 79.00 | 14.78 | 0.11 |  |
| 80.00 | 14.06 | 0.11 | 0.47 |
| 81.00 | 13.37 | 0.10 |  |
| 82.00 | 12.72 | 0.09 |  |
| 83.00 | 12.10 | 0.09 |  |
| 84.00 | 11.51 | 0.09 |  |
| 85.00 | 10.95 | 0.08 | 0.36 |
| 86.00 | 10.41 | 0.08 |  |
| 87.00 | 9.91 | 0.07 |  |
| 88.00 | 9.42 | 0.07 |  |
| 89.00 | 8.96 | 0.06 |  |
| 90.00 | 8.53 | 0.06 | 0.27 |
| 91.00 | 8.11 | 0.06 |  |
| 92.00 | 7.71 | 0.06 |  |
| 93.00 | 7.34 | 0.06 |  |
| 94.00 | 6.98 | 0.05 |  |
| 95.00 | 6.64 | 0.05 | 0.21 |