

## BAB V

### KESIMPULAN

Dikarenakan keterbatasan kanal frekuensi dalam sistem selular dan peningkatan permintaan akan jasa layanan komunikasi selular maka kanal frekuensi yang telah ada mengalami pengulangan. Pengulangan ini selain dapat meningkatkan jumlah kanal informasi yang dapat dilayani juga menimbulkan masalah interferensi. Interferensi yang terjadi pada pengulangan frekuensi adalah interferensi *cochannel*. Oleh karena itu diusahakan agar jarak pengulangan tidak terlalu dekat.

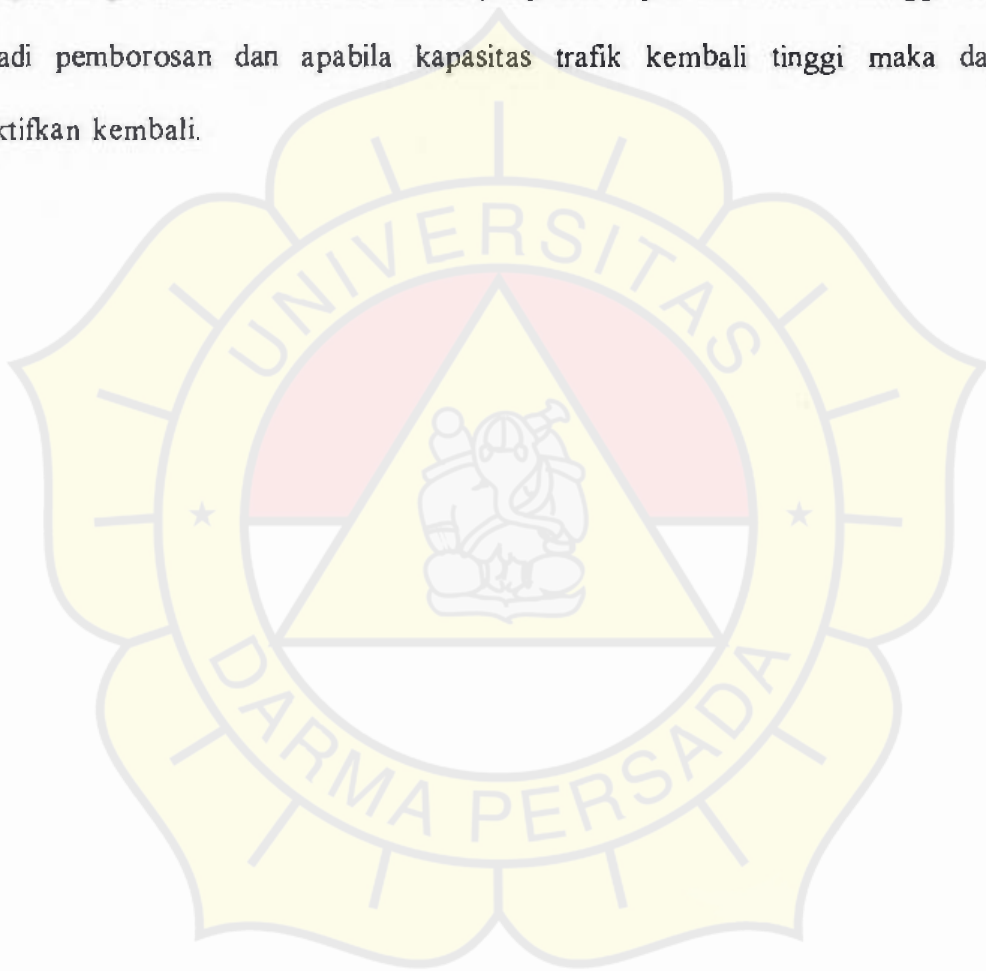
Untuk peningkatan kapasitas trafik yang tidak terlalu besar, dalam hal ini sebesar 30%, untuk *site* yang sama dan luas daerah cakupan yang sama metode *tighter frequency reuse* adalah yang paling tepat dikarenakan penambahan satu kanal frekuensi ke dalam *site* tidak akan menambah satu sel yang membutuhkan BTS tambahan. Dengan kapasitas sebesar 75,78 Erlang/km<sup>2</sup> sudah cukup tinggi untuk memenuhi permintaan sebesar 67 Erlang/km<sup>2</sup>.

Penerapan *microcell* tidak efisien digunakan karena daerah cakupan yang mengalami peningkatan adalah daerah cakupan yang sama dengan daerah cakupan *site* yang ada. *Microcell* hanya akan diterapkan untuk daerah di dalam suatu sel dengan radius lebih kecil yang memiliki trafik tinggi.

Sedangkan metode merubah jarak *site to site* menjadi 800 meter tidak efisien walaupun kapasitas yang dapat ditangani tidak terlalu besar dan cukup untuk menangani permintaan pelanggan yang semakin meningkat namun perubahan

jarak *site to site* mengakibatkan penambahan jumlah *site* dalam 1 km yang berarti menambah jumlah BTS.

Dengan penambahan satu kanal frekuensi ke dalam salah satu sel dalam suatu *site* cukup efisien mengingat permintaan pasar akan kebutuhan pelayanan telekomunikasi dapat berubah-ubah. Apabila kapasitas trafik pada sel tersebut mengalami penurunan, kanal frekuensi yang ada dapat dimatikan sehingga tidak terjadi pemborosan dan apabila kapasitas trafik kembali tinggi maka dapat diaktifkan kembali.



## DAFTAR PUSTAKA

- Endro Darwinto : *Diktat Kuliah Komunikasi Bergerak : Introduksi Sistem GSM Secara global*. 2000
- Lee, W.C.Y. : *Mobile Cellular Telecommunication : Analog and Digital Systems*. McGraw-Hill Inc, 1995.
- Lee, W.C.Y. : *Mobile Communications Design Fundamentals*. John Wiley & Sons Inc, 1993.
- Mehrota, A : *Cellular Radio : Analog and Digital Systems*. Norwood, MA. Artech House Inc, 1994.
- Mehrota, A : *Cellular Radio Performance Engineering*. Norwood, MA. Artech House Inc, 1994.
- ..... : *CME 20 Cell Planning Training Document*. Ericsson.
- ..... : *Tighter Frequency Reuse in CME 20/CMS40 and The Way Forward*. Ericsson.



LAMPIRAN A  
TABEL FREKUENSI GSM

|    |        |        |    |        |        |                          |        |        |
|----|--------|--------|----|--------|--------|--------------------------|--------|--------|
| 1  | 890.20 | 935.20 | 51 | 900.20 | 945.20 | 101                      | 910.20 | 955.20 |
| 2  | 890.40 | 935.40 | 52 | 900.40 | 945.40 | 102                      | 910.40 | 955.40 |
| 3  | 890.60 | 935.60 | 53 | 900.60 | 945.60 | 103                      | 910.60 | 955.60 |
| 4  | 890.80 | 935.80 | 54 | 900.80 | 945.80 | 104                      | 910.80 | 955.80 |
| 5  | 891.00 | 936.00 | 55 | 901.00 | 946.00 | 105                      | 911.00 | 956.00 |
| 6  | 891.20 | 936.20 | 56 | 901.20 | 946.20 | 106                      | 911.20 | 956.20 |
| 7  | 891.40 | 936.40 | 57 | 901.40 | 946.40 | 107                      | 911.40 | 956.40 |
| 8  | 891.60 | 936.60 | 58 | 901.60 | 946.60 | 108                      | 911.60 | 956.60 |
| 9  | 891.80 | 936.80 | 59 | 901.80 | 946.80 | 109                      | 911.80 | 956.80 |
| 10 | 892.00 | 937.00 | 60 | 902.00 | 947.00 | 110                      | 912.00 | 957.00 |
| 11 | 892.20 | 937.20 | 61 | 902.20 | 947.20 | 111                      | 912.20 | 957.20 |
| 12 | 892.40 | 937.40 | 62 | 902.40 | 947.40 | 112                      | 912.40 | 957.40 |
| 13 | 892.60 | 937.60 | 63 | 902.60 | 947.60 | 113                      | 912.60 | 957.60 |
| 14 | 892.80 | 937.80 | 64 | 902.80 | 947.80 | 114                      | 912.80 | 957.80 |
| 15 | 893.00 | 938.00 | 65 | 903.00 | 948.00 | 115                      | 913.00 | 958.00 |
| 16 | 893.20 | 938.20 | 66 | 903.20 | 948.20 | 116                      | 913.20 | 958.20 |
| 17 | 893.40 | 938.40 | 67 | 903.40 | 948.40 | 117                      | 913.40 | 958.40 |
| 18 | 893.60 | 938.60 | 68 | 903.60 | 948.60 | 118                      | 913.60 | 958.60 |
| 19 | 893.80 | 938.80 | 69 | 903.80 | 948.80 | 119                      | 913.80 | 958.80 |
| 20 | 894.00 | 939.00 | 70 | 904.00 | 949.00 | 120                      | 914.00 | 959.00 |
| 21 | 894.20 | 939.20 | 71 | 904.20 | 949.20 | 121                      | 914.20 | 959.20 |
| 22 | 894.40 | 939.40 | 72 | 904.40 | 949.40 | 122                      | 914.40 | 959.40 |
| 23 | 894.60 | 939.60 | 73 | 904.60 | 949.60 | 123                      | 914.60 | 959.60 |
| 24 | 894.80 | 939.80 | 74 | 904.80 | 949.80 | 124                      | 914.80 | 959.80 |
| 25 | 895.00 | 940.00 | 75 | 905.00 | 950.00 |                          |        |        |
| 26 | 895.20 | 940.20 | 76 | 905.20 | 950.20 |                          |        |        |
| 27 | 895.40 | 940.40 | 77 | 905.40 | 950.40 | No. Channal Excelcomindo |        |        |
| 28 | 895.60 | 940.60 | 78 | 905.60 | 950.60 |                          |        |        |
| 29 | 895.80 | 940.80 | 79 | 905.80 | 950.80 |                          |        |        |
| 30 | 896.00 | 941.00 | 80 | 906.00 | 951.00 |                          |        |        |
| 31 | 896.20 | 941.20 | 81 | 906.20 | 951.20 |                          |        |        |
| 32 | 896.40 | 941.40 | 82 | 906.40 | 951.40 |                          |        |        |
| 33 | 896.60 | 941.60 | 83 | 906.60 | 951.60 |                          |        |        |
| 34 | 896.80 | 941.80 | 84 | 906.80 | 951.80 |                          |        |        |
| 35 | 897.00 | 942.00 | 85 | 907.00 | 952.00 |                          |        |        |
| 36 | 897.20 | 942.20 | 86 | 907.20 | 952.20 |                          |        |        |
| 37 | 897.40 | 942.40 | 87 | 907.40 | 952.40 |                          |        |        |
| 38 | 897.60 | 942.60 | 88 | 907.60 | 952.60 |                          |        |        |
| 39 | 897.80 | 942.80 | 89 | 907.80 | 952.80 |                          |        |        |
| 40 | 898.00 | 943.00 | 90 | 908.00 | 953.00 |                          |        |        |
| 41 | 898.20 | 943.20 | 91 | 908.20 | 953.20 |                          |        |        |
| 42 | 898.40 | 943.40 | 92 | 908.40 | 953.40 |                          |        |        |
| 43 | 898.60 | 943.60 | 93 | 908.60 | 953.60 |                          |        |        |
| 44 | 898.80 | 943.80 | 94 | 908.80 | 953.80 |                          |        |        |
| 45 | 899.00 | 944.00 | 95 | 909.00 | 954.00 |                          |        |        |
| 46 | 899.20 | 944.20 | 96 | 909.20 | 954.20 |                          |        |        |
| 47 | 899.40 | 944.40 | 97 | 909.40 | 954.40 |                          |        |        |
| 48 | 899.60 | 944.60 | 98 | 909.60 | 954.60 |                          |        |        |
| 49 | 899.80 | 944.80 | 99 | 909.80 | 954.80 |                          |        |        |
| 50 | 900.00 | 945.00 | 00 | 910.00 | 955.00 |                          |        |        |



**LAMPIRAN B**

**TABEL ERLANG B**

|    | 0.01% | 0.02% | 0.03% | 0.04% | 0.05% | 0.06% | 0.07% | 0.08% | 0.09% | 1.0%  | 1.2%  | 1.5%  | 2%    | 3%    | 5%    | 7%    | 10%   | 15%   | 20%   | 30%   | 40%   | 50%   |      |
|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 1  | 0.001 | 0.002 | 0.003 | 0.005 | 0.010 | 0.020 | 0.030 | 0.040 | 0.050 | 0.070 | 0.081 | 0.091 | 0.101 | 0.121 | 0.152 | 0.204 | 0.309 | 0.526 | 0.753 | 1.11  | 1.76  | 2.50  | 3.48 |
| 2  | 0.014 | 0.020 | 0.028 | 0.037 | 0.048 | 0.064 | 0.086 | 0.111 | 0.141 | 0.176 | 0.215 | 0.250 | 0.290 | 0.334 | 0.382 | 0.434 | 0.491 | 0.554 | 0.621 | 0.692 | 0.767 | 0.844 |      |
| 3  | 0.068 | 0.110 | 0.152 | 0.194 | 0.239 | 0.283 | 0.326 | 0.368 | 0.410 | 0.452 | 0.494 | 0.536 | 0.578 | 0.619 | 0.660 | 0.701 | 0.742 | 0.783 | 0.824 | 0.865 | 0.906 | 0.947 |      |
| 4  | 0.235 | 0.282 | 0.315 | 0.352 | 0.389 | 0.426 | 0.463 | 0.500 | 0.537 | 0.574 | 0.611 | 0.648 | 0.685 | 0.722 | 0.759 | 0.796 | 0.833 | 0.870 | 0.907 | 0.944 | 0.981 | 1.018 |      |
| 5  | 0.452 | 0.527 | 0.577 | 0.649 | 0.722 | 0.795 | 0.868 | 0.941 | 1.014 | 1.087 | 1.160 | 1.233 | 1.306 | 1.379 | 1.452 | 1.525 | 1.598 | 1.671 | 1.744 | 1.817 | 1.890 | 1.963 |      |
| 6  | 0.728 | 0.832 | 0.900 | 0.995 | 1.115 | 1.233 | 1.345 | 1.445 | 1.545 | 1.645 | 1.745 | 1.845 | 1.945 | 2.045 | 2.145 | 2.245 | 2.345 | 2.445 | 2.545 | 2.645 | 2.745 | 2.845 |      |
| 7  | 1.05  | 1.19  | 1.27  | 1.39  | 1.58  | 1.80  | 2.06  | 2.31  | 2.56  | 2.81  | 3.06  | 3.31  | 3.56  | 3.81  | 4.06  | 4.31  | 4.56  | 4.81  | 5.06  | 5.31  | 5.56  | 5.81  |      |
| 8  | 1.48  | 1.58  | 1.69  | 1.83  | 2.05  | 2.31  | 2.56  | 2.81  | 3.06  | 3.31  | 3.56  | 3.81  | 4.06  | 4.31  | 4.56  | 4.81  | 5.06  | 5.31  | 5.56  | 5.81  | 6.06  | 6.31  |      |
| 9  | 1.93  | 2.01  | 2.13  | 2.30  | 2.56  | 2.85  | 3.05  | 3.21  | 3.44  | 3.54  | 3.71  | 3.81  | 4.01  | 4.16  | 4.31  | 4.46  | 4.61  | 4.76  | 4.91  | 5.06  | 5.21  | 5.36  |      |
| 10 | 2.26  | 2.47  | 2.61  | 2.80  | 3.09  | 3.43  | 3.65  | 3.82  | 4.08  | 4.19  | 4.29  | 4.38  | 4.48  | 4.58  | 4.68  | 4.78  | 4.88  | 4.98  | 5.08  | 5.18  | 5.28  | 5.38  |      |
| 11 | 2.72  | 2.96  | 3.12  | 3.33  | 3.65  | 4.02  | 4.27  | 4.45  | 4.74  | 4.86  | 4.97  | 5.07  | 5.16  | 5.26  | 5.36  | 5.46  | 5.56  | 5.66  | 5.76  | 5.86  | 5.96  | 6.06  |      |
| 12 | 3.21  | 3.47  | 3.65  | 3.88  | 4.23  | 4.64  | 4.90  | 5.11  | 5.28  | 5.43  | 5.55  | 5.67  | 5.78  | 5.89  | 6.00  | 6.11  | 6.22  | 6.33  | 6.44  | 6.55  | 6.66  | 6.77  |      |
| 13 | 3.71  | 4.01  | 4.19  | 4.45  | 4.83  | 5.27  | 5.56  | 5.78  | 5.96  | 6.12  | 6.26  | 6.39  | 6.52  | 6.65  | 6.78  | 6.91  | 7.04  | 7.17  | 7.30  | 7.43  | 7.56  | 7.69  |      |
| 14 | 4.24  | 4.56  | 4.76  | 5.03  | 5.45  | 5.92  | 6.23  | 6.47  | 6.66  | 6.83  | 6.98  | 7.12  | 7.24  | 7.37  | 7.50  | 7.63  | 7.76  | 7.89  | 8.02  | 8.15  | 8.28  | 8.41  |      |
| 15 | 4.78  | 5.12  | 5.34  | 5.63  | 6.08  | 6.58  | 6.91  | 7.17  | 7.38  | 7.56  | 7.71  | 7.89  | 8.01  | 8.15  | 8.28  | 8.41  | 8.54  | 8.67  | 8.80  | 8.93  | 9.06  | 9.19  |      |
| 16 | 5.34  | 5.70  | 5.94  | 6.25  | 6.72  | 7.26  | 7.61  | 7.88  | 8.10  | 8.29  | 8.46  | 8.61  | 8.75  | 8.88  | 9.01  | 9.15  | 9.28  | 9.41  | 9.54  | 9.67  | 9.80  | 9.93  |      |
| 17 | 5.91  | 6.30  | 6.55  | 6.88  | 7.38  | 7.95  | 8.32  | 8.60  | 8.83  | 9.03  | 9.21  | 9.37  | 9.52  | 9.65  | 9.78  | 9.91  | 10.04 | 10.17 | 10.30 | 10.43 | 10.56 | 10.69 |      |
| 18 | 6.50  | 6.91  | 7.17  | 7.52  | 8.05  | 8.64  | 9.03  | 9.33  | 9.58  | 9.79  | 9.98  | 10.1  | 10.3  | 10.5  | 10.7  | 10.9  | 11.1  | 11.3  | 11.5  | 11.7  | 11.9  | 12.1  |      |
| 19 | 7.09  | 7.53  | 7.80  | 8.17  | 8.72  | 9.35  | 9.76  | 10.1  | 10.3  | 10.6  | 10.9  | 11.1  | 11.3  | 11.5  | 11.7  | 11.9  | 12.1  | 12.3  | 12.5  | 12.7  | 12.9  | 13.1  |      |
| 20 | 7.70  | 8.16  | 8.44  | 8.83  | 9.41  | 10.1  | 10.5  | 10.8  | 11.1  | 11.3  | 11.5  | 11.7  | 11.9  | 12.1  | 12.3  | 12.5  | 12.7  | 12.9  | 13.1  | 13.3  | 13.5  | 13.7  |      |
| 21 | 8.32  | 8.79  | 9.10  | 9.50  | 10.1  | 10.8  | 11.2  | 11.6  | 11.9  | 12.1  | 12.3  | 12.5  | 12.7  | 12.9  | 13.1  | 13.3  | 13.5  | 13.7  | 13.9  | 14.1  | 14.3  | 14.5  |      |
| 22 | 8.95  | 9.44  | 9.76  | 10.2  | 10.8  | 11.5  | 12.0  | 12.3  | 12.6  | 12.9  | 13.1  | 13.3  | 13.5  | 13.7  | 13.9  | 14.1  | 14.3  | 14.5  | 14.7  | 14.9  | 15.1  | 15.3  |      |
| 23 | 9.58  | 10.1  | 10.4  | 10.9  | 11.5  | 12.3  | 12.7  | 13.1  | 13.4  | 13.7  | 13.9  | 14.1  | 14.3  | 14.5  | 14.7  | 14.9  | 15.1  | 15.3  | 15.5  | 15.7  | 15.9  | 16.1  |      |
| 24 | 10.2  | 10.7  | 11.1  | 11.6  | 12.2  | 13.0  | 13.5  | 13.9  | 14.2  | 14.5  | 14.7  | 14.9  | 15.1  | 15.3  | 15.5  | 15.7  | 15.9  | 16.1  | 16.3  | 16.5  | 16.7  | 16.9  |      |
| 25 | 10.9  | 11.4  | 11.8  | 12.3  | 13.0  | 13.8  | 14.3  | 14.7  | 15.0  | 15.3  | 15.5  | 15.7  | 15.9  | 16.1  | 16.3  | 16.5  | 16.7  | 16.9  | 17.1  | 17.3  | 17.5  | 17.7  |      |
| 26 | 11.5  | 12.8  | 13.5  | 14.0  | 14.7  | 15.5  | 16.1  | 16.5  | 16.8  | 17.1  | 17.4  | 17.6  | 17.8  | 18.0  | 18.2  | 18.4  | 18.6  | 18.8  | 19.0  | 19.2  | 19.4  | 19.6  |      |
| 27 | 12.2  | 13.5  | 14.2  | 14.8  | 15.6  | 16.4  | 16.9  | 17.4  | 17.7  | 18.0  | 18.2  | 18.4  | 18.6  | 18.8  | 19.0  | 19.2  | 19.4  | 19.6  | 19.8  | 20.0  | 20.2  | 20.4  |      |
| 28 | 12.9  | 14.2  | 14.9  | 15.5  | 16.3  | 17.1  | 17.6  | 18.1  | 18.4  | 18.7  | 18.9  | 19.1  | 19.3  | 19.5  | 19.7  | 19.9  | 20.1  | 20.3  | 20.5  | 20.7  | 20.9  | 21.1  |      |
| 29 | 13.6  | 14.9  | 15.6  | 16.2  | 17.0  | 17.8  | 18.3  | 18.8  | 19.1  | 19.4  | 19.6  | 19.8  | 20.0  | 20.3  | 20.5  | 20.7  | 20.9  | 21.1  | 21.3  | 21.5  | 21.7  | 21.9  |      |
| 30 | 14.2  | 15.5  | 16.2  | 16.8  | 17.6  | 18.4  | 18.9  | 19.4  | 19.7  | 20.0  | 20.2  | 20.4  | 20.6  | 20.8  | 21.0  | 21.2  | 21.4  | 21.6  | 21.8  | 22.0  | 22.2  | 22.4  |      |
| 31 | 14.9  | 16.2  | 16.9  | 17.5  | 18.3  | 19.1  | 19.6  | 20.1  | 20.4  | 20.7  | 20.9  | 21.1  | 21.3  | 21.5  | 21.7  | 21.9  | 22.1  | 22.3  | 22.5  | 22.7  | 22.9  | 23.1  |      |
| 32 | 15.6  | 16.9  | 17.6  | 18.2  | 19.0  | 19.8  | 20.3  | 20.7  | 21.0  | 21.3  | 21.5  | 21.7  | 21.9  | 22.1  | 22.3  | 22.5  | 22.7  | 22.9  | 23.1  | 23.3  | 23.5  | 23.7  |      |
| 33 | 16.3  | 17.6  | 18.3  | 18.9  | 19.7  | 20.5  | 21.0  | 21.4  | 21.7  | 22.0  | 22.2  | 22.4  | 22.6  | 22.8  | 23.0  | 23.2  | 23.4  | 23.6  | 23.8  | 24.0  | 24.2  | 24.4  |      |
| 34 | 17.0  | 18.3  | 19.0  | 19.6  | 20.4  | 21.2  | 21.7  | 22.1  | 22.4  | 22.7  | 22.9  | 23.1  | 23.3  | 23.5  | 23.7  | 23.9  | 24.1  | 24.3  | 24.5  | 24.7  | 24.9  | 25.1  |      |
| 35 | 17.8  | 19.1  | 19.8  | 20.4  | 21.2  | 22.0  | 22.5  | 22.9  | 23.2  | 23.5  | 23.7  | 23.9  | 24.1  | 24.3  | 24.5  | 24.7  | 24.9  | 25.1  | 25.3  | 25.5  | 25.7  | 25.9  |      |
| 36 | 18.5  | 19.8  | 20.5  | 21.1  | 21.9  | 22.7  | 23.2  | 23.6  | 23.9  | 24.2  | 24.4  | 24.6  | 24.8  | 25.0  | 25.2  | 25.4  | 25.6  | 25.8  | 26.0  | 26.2  | 26.4  | 26.6  |      |
| 37 | 19.2  | 20.5  | 21.2  | 21.8  | 22.6  | 23.4  | 23.9  | 24.3  | 24.6  | 24.9  | 25.1  | 25.3  | 25.5  | 25.7  | 25.9  | 26.1  | 26.3  | 26.5  | 26.7  | 26.9  | 27.1  | 27.3  |      |
| 38 | 19.9  | 21.2  | 21.9  | 22.5  | 23.3  | 24.1  | 24.6  | 25.0  | 25.3  | 25.6  | 25.8  | 26.0  | 26.2  | 26.4  | 26.6  | 26.8  | 27.0  | 27.2  | 27.4  | 27.6  | 27.8  | 28.0  |      |
| 39 | 20.6  | 21.9  | 22.6  | 23.2  | 24.0  | 24.8  | 25.3  | 25.7  | 26.0  | 26.3  | 26.5  | 26.7  | 26.9  | 27.1  | 27.3  | 27.5  | 27.7  | 27.9  | 28.1  | 28.3  | 28.5  | 28.7  |      |
| 40 | 21.3  | 22.6  | 23.3  | 24.0  | 24.8  | 25.6  | 26.1  | 26.5  | 26.8  | 27.1  | 27.3  | 27.5  | 27.7  | 27.9  | 28.1  | 28.3  | 28.5  | 28.7  | 28.9  | 29.1  | 29.3  | 29.5  |      |
| 41 | 22.1  | 23.4  | 24.1  | 24.8  | 25.6  | 26.4  | 26.9  | 27.3  | 27.6  | 27.9  | 28.1  | 28.3  | 28.5  | 28.7  | 28.9  | 29.1  | 29.3  | 29.5  | 29.7  | 29.9  | 30.1  | 30.3  |      |
| 42 | 22.8  | 24.1  | 24.8  | 25.5  | 26.3  | 27.1  | 27.6  | 28.0  | 28.3  | 28.6  | 28.8  | 29.0  | 29.2  | 29.4  | 29.6  | 29.8  | 30.0  | 30.2  | 30.4  | 30.6  | 30.8  | 31.0  |      |
| 43 | 23.6  | 24.9  | 25.6  | 26.3  | 27.1  | 27.9  | 28.4  | 28.8  | 29.1  | 29.4  | 29.6  | 29.8  | 30.0  | 30.2  | 30.4  | 30.6  | 30.8  | 31.0  | 31.2  | 31.4  | 31.6  | 31.8  |      |
| 44 | 24.3  | 25.6  | 26.3  | 27.0  | 27.8  | 28.6  | 29.1  | 29.5  | 29.8  | 30.1  | 30.3  | 30.5  | 30.7  | 30.9  | 31.1  | 31.3  | 31.5  | 31.7  | 31.9  | 32.1  | 32.3  | 32.5  |      |
| 45 | 25.1  | 26.4  | 27.1  | 27.8  | 28.6  | 29.4  | 29.9  | 30.3  | 30.6  | 30.9  | 31.1  | 31.3  | 31.5  | 31.7  | 31.9  | 32.1  | 32.3  | 32.5  | 32.7  | 32.9  | 33.1  | 33.3  |      |
| 46 | 25.8  | 27.1  | 27.8  | 28.5  | 29.3  | 30.1  | 30.6  | 31.0  | 31.3  | 31.6  | 31.8  | 32.0  | 32.2  | 32.4  | 32.6  | 32.8  | 33.0  | 33.2  | 33.4  | 33.6  | 33.8  | 34.0  |      |
| 47 | 26.6  | 27.9  | 28.6  | 29.3  | 30.1  | 30.9  | 31.4  | 31.8  | 32.1  | 32.4  | 32.6  | 32.8  | 33.0  | 33.2  | 33.4  | 33.6  | 33.8  | 34.0  | 34.2  | 34.4  | 34.6  | 34.8  |      |
| 48 | 27.4  | 28.7  | 29.4  | 30.1  | 30.9  | 31.7  | 32.2  | 32.6  | 32.9  | 33.2  | 33.4  | 33.6  | 33.8  | 34.0  | 34.2  | 34.4  | 34.6  | 34.8  | 35.0  | 35.2  | 35.4  | 35.6  |      |
| 49 | 28.1  | 29.4  | 30.1  | 30.8  | 31.6  | 32.4  | 32.9  | 33.3  | 33.6  | 33.9  | 34.1  | 34.3  | 34.5  | 34.7  | 34.9  | 35.1  | 35.3  | 35.5  | 35.7  | 35.9  | 36.1  | 36.3  |      |
| 50 | 28.9  | 30.2  | 30.9  | 31.6  | 32.4  | 33.2  | 33.7  | 34.1  | 34.4  | 34.7  | 34.9  | 35.1  | 35.3  | 35.5  | 35.7  | 35.9  | 36.1  | 36.3  | 36.5  | 36.7  | 36.9  | 37.1  |      |

| N  | 0.01% | 0.02% | 0.03% | 0.05% | 0.1% | 0.2% | 0.3% | 0.4% | 0.5% | 0.6% | 0.7% | 0.8% | 0.9% | 1.0% | 1.2% | 1.5% | 2%   | 3%   | 5%   | 7%   | 10%  | 15%   | 20%   | 30%   | 40%   | 50%   |
|----|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| 50 | 28.9  | 29.9  | 30.5  | 31.3  | 32.5 | 33.9 | 34.8 | 35.4 | 36.0 | 36.5 | 36.9 | 37.2 | 37.6 | 37.9 | 38.5 | 39.2 | 40.3 | 41.9 | 44.5 | 46.7 | 49.6 | 54.0  | 58.5  | 68.5  | 81.0  | 98.1  |
| 51 | 29.6  | 30.6  | 31.3  | 32.1  | 33.3 | 34.7 | 35.6 | 36.3 | 36.9 | 37.3 | 37.8 | 38.1 | 38.5 | 38.8 | 39.4 | 40.1 | 41.2 | 42.9 | 45.5 | 47.7 | 50.6 | 55.2  | 59.7  | 69.9  | 82.7  | 100.1 |
| 52 | 30.4  | 31.4  | 32.0  | 32.9  | 34.2 | 35.6 | 36.5 | 37.2 | 37.7 | 38.2 | 38.6 | 39.0 | 39.4 | 39.7 | 40.3 | 41.0 | 42.1 | 43.9 | 46.5 | 48.8 | 51.7 | 56.3  | 61.0  | 71.3  | 84.3  | 102.1 |
| 53 | 31.2  | 32.2  | 32.8  | 33.7  | 35.0 | 36.4 | 37.3 | 38.0 | 38.5 | 39.0 | 39.5 | 39.9 | 40.3 | 40.6 | 41.2 | 42.0 | 43.1 | 44.8 | 47.5 | 49.8 | 52.8 | 57.5  | 62.2  | 72.7  | 86.0  | 104.1 |
| 54 | 31.9  | 33.0  | 33.6  | 34.5  | 35.8 | 37.2 | 38.2 | 39.0 | 39.5 | 40.0 | 40.4 | 40.8 | 41.2 | 41.5 | 42.1 | 42.9 | 44.0 | 45.8 | 48.5 | 50.8 | 53.9 | 58.7  | 63.5  | 74.2  | 87.6  | 106.1 |
| 55 | 32.7  | 33.8  | 34.4  | 35.3  | 36.6 | 38.1 | 39.0 | 39.8 | 40.4 | 40.9 | 41.3 | 41.7 | 42.1 | 42.4 | 43.0 | 43.8 | 44.9 | 46.7 | 49.5 | 51.9 | 55.0 | 59.8  | 64.7  | 75.6  | 89.3  | 108.1 |
| 56 | 33.5  | 34.6  | 35.2  | 36.1  | 37.5 | 38.9 | 39.9 | 40.6 | 41.2 | 41.7 | 42.2 | 42.6 | 43.0 | 43.3 | 43.9 | 44.7 | 45.9 | 47.7 | 50.5 | 52.9 | 56.1 | 61.0  | 65.9  | 77.0  | 91.0  | 110.1 |
| 57 | 34.3  | 35.4  | 36.0  | 36.9  | 38.3 | 39.8 | 40.8 | 41.5 | 42.1 | 42.6 | 43.1 | 43.5 | 43.9 | 44.2 | 44.8 | 45.7 | 46.8 | 48.7 | 51.5 | 53.9 | 57.1 | 62.1  | 67.2  | 78.4  | 92.6  | 111.3 |
| 58 | 35.1  | 36.2  | 36.8  | 37.8  | 39.1 | 40.6 | 41.6 | 42.4 | 43.0 | 43.5 | 44.0 | 44.4 | 44.8 | 45.1 | 45.8 | 46.6 | 47.8 | 49.6 | 52.6 | 55.0 | 58.2 | 63.3  | 68.4  | 79.8  | 94.3  | 112.5 |
| 59 | 35.8  | 37.0  | 37.6  | 38.6  | 40.0 | 41.5 | 42.5 | 43.3 | 43.9 | 44.4 | 44.8 | 45.3 | 45.7 | 46.0 | 46.7 | 47.5 | 48.7 | 50.6 | 53.6 | 56.0 | 59.3 | 64.5  | 69.7  | 81.3  | 96.0  | 116.1 |
| 60 | 36.6  | 37.8  | 38.5  | 39.4  | 40.8 | 42.4 | 43.4 | 44.1 | 44.8 | 45.3 | 45.8 | 46.2 | 46.6 | 46.9 | 47.6 | 48.4 | 49.6 | 51.6 | 54.6 | 57.1 | 60.4 | 65.6  | 70.9  | 82.7  | 97.6  | 118.1 |
| 61 | 37.4  | 38.6  | 39.3  | 40.2  | 41.6 | 43.2 | 44.2 | 45.0 | 45.6 | 46.2 | 46.7 | 47.1 | 47.5 | 47.9 | 48.5 | 49.4 | 50.6 | 52.5 | 55.6 | 58.1 | 61.5 | 66.8  | 72.1  | 84.1  | 99.3  | 120.1 |
| 62 | 38.2  | 39.4  | 40.1  | 41.0  | 42.5 | 44.1 | 45.1 | 45.9 | 46.5 | 47.1 | 47.6 | 48.0 | 48.4 | 48.8 | 49.4 | 50.3 | 51.5 | 53.5 | 56.6 | 59.1 | 62.6 | 68.0  | 73.4  | 85.5  | 101.0 | 122.1 |
| 63 | 39.0  | 40.2  | 40.9  | 41.9  | 43.3 | 44.9 | 46.0 | 46.8 | 47.4 | 48.0 | 48.5 | 48.9 | 49.3 | 49.7 | 50.4 | 51.2 | 52.5 | 54.5 | 57.6 | 60.2 | 63.7 | 69.1  | 74.6  | 86.7  | 102.6 | 124.1 |
| 64 | 39.8  | 41.0  | 41.7  | 42.7  | 44.2 | 45.8 | 46.8 | 47.6 | 48.3 | 48.9 | 49.4 | 49.8 | 50.2 | 50.6 | 51.3 | 52.2 | 53.4 | 55.4 | 58.6 | 61.2 | 64.8 | 70.3  | 75.9  | 88.0  | 104.3 | 126.1 |
| 65 | 40.6  | 41.8  | 42.5  | 43.5  | 45.0 | 46.6 | 47.7 | 48.5 | 49.2 | 49.8 | 50.3 | 50.7 | 51.1 | 51.5 | 52.2 | 53.1 | 54.4 | 56.4 | 59.6 | 62.3 | 66.0 | 71.4  | 77.1  | 89.2  | 106.0 | 128.1 |
| 66 | 41.4  | 42.6  | 43.3  | 44.4  | 45.8 | 47.5 | 48.6 | 49.4 | 50.1 | 50.7 | 51.2 | 51.6 | 52.0 | 52.4 | 53.1 | 54.0 | 55.3 | 57.4 | 60.6 | 63.3 | 67.0 | 72.6  | 78.3  | 90.4  | 107.6 | 130.1 |
| 67 | 42.2  | 43.4  | 44.2  | 45.2  | 46.7 | 48.3 | 49.5 | 50.3 | 51.0 | 51.6 | 52.1 | 52.5 | 52.9 | 53.4 | 54.1 | 55.0 | 56.3 | 58.4 | 61.6 | 64.3 | 68.0 | 73.8  | 79.6  | 91.7  | 109.3 | 132.1 |
| 68 | 43.0  | 44.2  | 45.0  | 46.0  | 47.5 | 49.2 | 50.3 | 51.2 | 51.9 | 52.5 | 53.0 | 53.4 | 53.9 | 54.3 | 55.0 | 55.9 | 57.2 | 59.3 | 62.6 | 65.4 | 69.1 | 74.9  | 80.8  | 92.9  | 111.0 | 134.1 |
| 69 | 43.8  | 45.0  | 45.8  | 46.8  | 48.4 | 50.1 | 51.2 | 52.1 | 52.8 | 53.4 | 53.9 | 54.4 | 54.8 | 55.2 | 55.9 | 56.9 | 58.2 | 60.3 | 63.7 | 66.5 | 70.2 | 76.1  | 82.1  | 94.2  | 112.6 | 136.1 |
| 70 | 44.6  | 45.8  | 46.6  | 47.7  | 49.2 | 51.0 | 52.1 | 53.0 | 53.7 | 54.3 | 54.8 | 55.3 | 55.7 | 56.1 | 56.8 | 57.8 | 59.1 | 61.3 | 64.7 | 67.5 | 71.3 | 77.3  | 83.3  | 95.5  | 114.3 | 138.1 |
| 71 | 45.4  | 46.7  | 47.5  | 48.5  | 50.1 | 51.8 | 53.0 | 53.8 | 54.6 | 55.2 | 55.7 | 56.2 | 56.6 | 57.0 | 57.8 | 58.7 | 60.1 | 62.3 | 65.7 | 68.5 | 72.4 | 78.4  | 84.6  | 96.8  | 115.9 | 140.1 |
| 72 | 46.2  | 47.5  | 48.3  | 49.4  | 50.9 | 52.7 | 53.9 | 54.7 | 55.5 | 56.1 | 56.6 | 57.1 | 57.5 | 58.0 | 58.9 | 59.7 | 61.2 | 63.4 | 66.8 | 69.6 | 73.5 | 79.6  | 85.9  | 98.2  | 117.6 | 142.1 |
| 73 | 47.0  | 48.4  | 49.1  | 50.2  | 51.8 | 53.6 | 54.7 | 55.6 | 56.4 | 57.0 | 57.5 | 58.0 | 58.5 | 59.0 | 59.6 | 60.6 | 62.1 | 64.2 | 67.7 | 70.5 | 74.6 | 80.8  | 87.0  | 100.2 | 119.3 | 144.1 |
| 74 | 47.8  | 49.1  | 49.9  | 51.0  | 52.7 | 54.5 | 55.6 | 56.5 | 57.3 | 57.9 | 58.4 | 58.9 | 59.4 | 59.8 | 60.6 | 61.8 | 63.2 | 65.2 | 68.7 | 71.7 | 75.8 | 81.9  | 88.3  | 101.7 | 120.9 | 146.1 |
| 75 | 48.6  | 49.9  | 50.8  | 51.9  | 53.5 | 55.3 | 56.5 | 57.4 | 58.2 | 58.8 | 59.3 | 59.8 | 60.3 | 60.7 | 61.5 | 62.5 | 63.9 | 65.2 | 69.7 | 72.7 | 76.7 | 83.1  | 89.5  | 102.7 | 122.9 | 148.1 |
| 76 | 49.4  | 50.8  | 51.6  | 52.7  | 54.4 | 56.2 | 57.4 | 58.3 | 59.1 | 59.7 | 60.3 | 60.8 | 61.2 | 61.7 | 62.4 | 63.4 | 64.9 | 67.2 | 70.8 | 73.8 | 77.8 | 84.2  | 90.6  | 103.5 | 124.3 | 150.0 |
| 77 | 50.2  | 51.6  | 52.4  | 53.5  | 55.2 | 57.1 | 58.3 | 59.2 | 60.0 | 60.6 | 61.2 | 61.7 | 62.1 | 62.6 | 63.4 | 64.4 | 65.8 | 68.1 | 71.8 | 74.8 | 78.9 | 85.4  | 91.8  | 102.9 | 125.9 | 152.0 |
| 78 | 51.1  | 52.4  | 53.1  | 54.4  | 56.1 | 58.0 | 59.2 | 60.1 | 60.9 | 61.5 | 62.1 | 62.6 | 63.1 | 63.5 | 64.3 | 65.3 | 66.8 | 69.1 | 72.8 | 75.9 | 80.0 | 86.6  | 93.0  | 104.0 | 126.6 | 154.0 |
| 79 | 51.9  | 53.2  | 54.1  | 55.3  | 56.9 | 58.8 | 60.1 | 61.0 | 61.8 | 62.4 | 63.0 | 63.5 | 64.0 | 64.4 | 65.2 | 66.3 | 67.7 | 70.1 | 73.8 | 76.9 | 81.1 | 87.7  | 94.5  | 105.5 | 127.3 | 156.0 |
| 80 | 52.7  | 54.1  | 54.9  | 56.1  | 57.8 | 59.7 | 61.0 | 61.9 | 62.7 | 63.3 | 63.9 | 64.4 | 64.9 | 65.4 | 66.2 | 67.2 | 68.7 | 71.1 | 74.8 | 78.0 | 82.2 | 88.9  | 95.7  | 106.7 | 128.0 | 158.0 |
| 81 | 53.5  | 54.9  | 55.8  | 56.9  | 58.7 | 60.6 | 61.8 | 62.8 | 63.6 | 64.2 | 64.8 | 65.4 | 65.8 | 66.3 | 67.1 | 68.2 | 69.6 | 72.1 | 75.8 | 79.0 | 83.3 | 90.1  | 97.0  | 108.0 | 128.6 | 160.0 |
| 82 | 54.3  | 55.7  | 56.6  | 57.8  | 59.5 | 61.5 | 62.7 | 63.7 | 64.5 | 65.2 | 65.7 | 66.3 | 66.8 | 67.2 | 68.0 | 69.1 | 70.6 | 73.0 | 76.9 | 80.1 | 84.3 | 91.2  | 98.2  | 109.2 | 129.2 | 162.0 |
| 83 | 55.1  | 56.6  | 57.5  | 58.6  | 60.4 | 62.4 | 63.6 | 64.6 | 65.4 | 66.1 | 66.7 | 67.2 | 67.7 | 68.2 | 68.9 | 69.7 | 71.1 | 73.5 | 77.4 | 80.6 | 84.8 | 91.8  | 98.8  | 109.8 | 130.0 | 164.0 |
| 84 | 56.0  | 57.4  | 58.3  | 59.5  | 61.3 | 63.2 | 64.5 | 65.5 | 66.3 | 67.0 | 67.6 | 68.1 | 68.6 | 69.1 | 69.9 | 71.0 | 72.5 | 75.0 | 78.9 | 82.2 | 86.5 | 93.6  | 100.7 | 111.9 | 130.6 | 166.0 |
| 85 | 56.8  | 58.2  | 59.1  | 60.4  | 62.1 | 64.1 | 65.4 | 66.4 | 67.2 | 67.9 | 68.5 | 69.1 | 69.6 | 70.0 | 70.9 | 71.9 | 73.5 | 76.0 | 79.9 | 83.2 | 87.7 | 94.7  | 102.0 | 113.2 | 131.2 | 168.0 |
| 86 | 57.6  | 59.1  | 60.0  | 61.2  | 63.0 | 65.0 | 66.3 | 67.3 | 68.1 | 68.8 | 69.4 | 70.0 | 70.5 | 70.9 | 71.8 | 72.9 | 74.5 | 77.0 | 80.9 | 84.3 | 88.8 | 95.9  | 103.2 | 114.4 | 131.2 | 170.0 |
| 87 | 58.4  | 59.9  | 60.8  | 62.1  | 63.9 | 65.9 | 67.2 | 68.2 | 69.0 | 69.7 | 70.3 | 70.9 | 71.4 | 71.9 | 72.7 | 73.8 | 75.4 | 78.0 | 81.9 | 85.3 | 89.9 | 97.1  | 104.5 | 115.7 | 132.0 | 172.0 |
| 88 | 59.3  | 60.8  | 61.7  | 62.9  | 64.7 | 66.8 | 68.1 | 69.1 | 69.9 | 70.6 | 71.3 | 71.8 | 72.3 | 72.8 | 73.7 | 74.8 | 76.4 | 78.9 | 82.8 | 86.2 | 90.8 | 98.0  | 105.4 | 116.7 | 132.6 | 174.0 |
| 89 | 60.1  | 61.6  | 62.5  | 63.8  | 65.6 | 67.7 | 69.0 | 70.0 | 70.8 | 71.6 | 72.2 | 72.8 | 73.3 | 73.7 | 74.6 | 75.7 | 77.3 | 79.9 | 83.8 | 87.2 | 91.8 | 99.0  | 106.4 | 117.9 | 133.2 | 176.0 |
| 90 | 60.9  | 62.4  | 63.4  | 64.6  | 66.5 | 68.6 | 69.9 | 70.9 | 71.8 | 72.5 | 73.1 | 73.7 | 74.2 | 74.7 | 75.6 | 76.7 | 78.3 | 80.9 | 84.8 | 88.2 | 92.9 | 100.0 | 107.2 | 118.2 | 133.8 | 178.0 |
| 91 | 61.8  | 63.3  | 64.2  | 65.5  | 67.4 | 69.4 | 70.8 | 71.8 | 72.7 | 73.4 | 74.0 | 74.6 | 75.1 | 75.6 | 76.5 | 77.6 | 79.3 | 81.9 | 85.8 | 89.2 | 93.9 | 101.0 | 108.2 | 119.2 | 134.4 | 180.0 |
| 92 | 62.6  | 64.1  | 65.1  | 66.3  | 68.2 | 70.3 | 71.7 | 72.7 | 73.6 | 74.3 | 75.0 | 75.5 | 76.0 | 76.6 | 77.4 | 78.5 | 80.2 | 82.9 | 86.8 | 90.2 | 94.9 | 102.0 | 109.2 | 120.2 | 135.0 | 182.0 |
| 93 | 63.4  | 65.0  | 65.9  | 67.2  | 69.1 | 71.2 | 72.6 | 73.6 | 74.5 | 75.2 | 75.9 | 76.5 | 77.0 | 77.6 | 78.4 | 79.5 | 81.2 | 83.9 | 87.8 | 91.2 | 95.9 | 103.0 | 110.2 | 121.2 | 135.6 | 184.0 |
| 94 | 64.2  | 65.8  | 66.8  | 68.1  | 70.0 | 72.1 | 73.5 | 74.5 | 75.4 | 76.2 | 76.8 | 77.4 | 77.9 | 78.4 | 79.3 | 80.5 | 82.2 | 84.9 | 88.8 | 92.2 | 96.9 | 104.0 | 111.2 | 122.2 | 136.2 | 186.0 |
| 95 | 65.1  | 66.6  | 67.6  | 68.9  | 70.9 | 73.0 | 74.4 | 75.5 | 76.3 | 77.1 | 77.7 | 78.3 | 78.9 | 79.4 | 80.3 | 81.5 | 83.1 | 85.8 | 89.6 | 93.0 | 97.7 | 104.8 | 111.9 | 123.2 | 136.8 | 188.0 |
| 96 | 65.9  | 67.5  | 68.5  | 69.8  | 71.7 | 73.9 | 75.3 | 76.4 | 77.2 | 78.0 | 78.7 | 79.3 | 79.8 | 80.3 | 81.2 | 82.4 | 84.1 | 86.8 | 90.6 | 94.0 | 98.7 | 105.8 | 112.5 | 124.2 | 137.4 | 190.0 |
| 97 | 66.8  | 68.3  | 69.3  | 70.7  | 72.6 | 74.8 | 76.2 | 77.3 | 78.2 | 79.0 | 79.6 | 80.2 | 80.7 | 81.2 | 82.2 | 83.4 | 85.1 | 87.8 | 91.6 | 95.0 | 99.7 | 106.8 | 113.5 | 125.2 | 138.0 | 192.0 |
| 98 | 67.6  | 69.2  | 70.2  | 71.5  | 73.5 | 75.7 | 77.1 | 78.2 | 79.1 | 79.8 | 80.5 | 81.1 | 81.7 | 82.2 | 83.1 | 84.3 | 86.0 |      |      |      |      |       |       |       |       |       |



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Jenis Kelamin : Perempuan

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