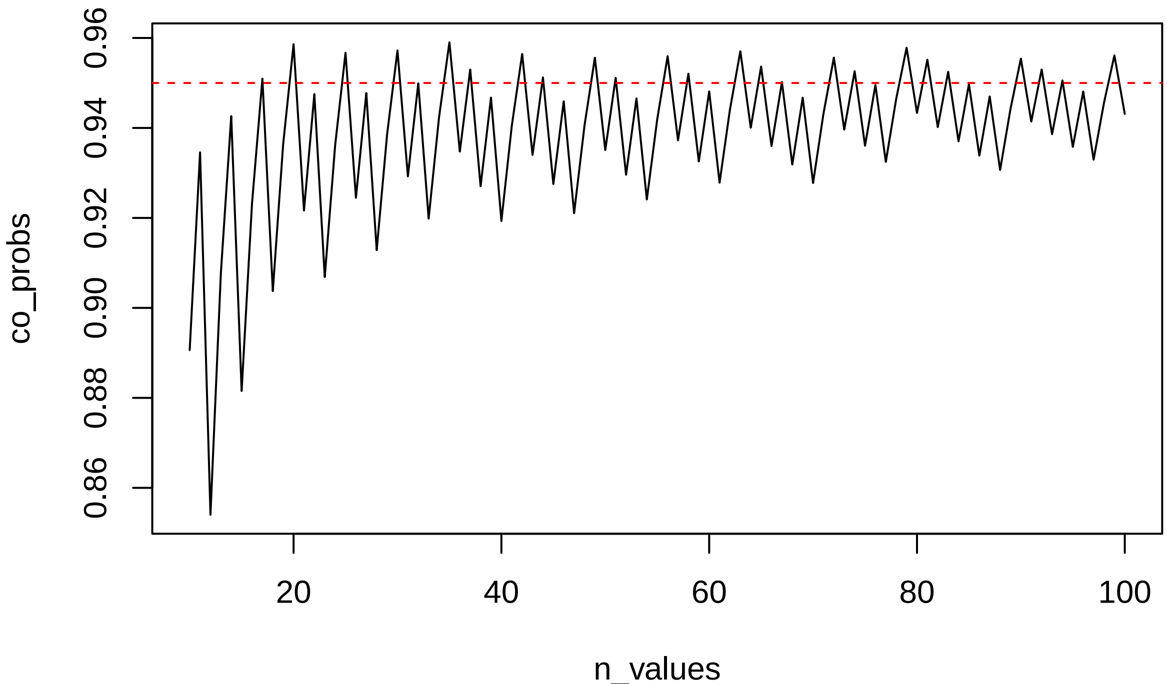
```r
set.seed(131131)

wald_co_prob <- function(n, p, alpha) {
    z <- qnorm(1 - alpha / 2)
    k <- 0:n
    p_hat <- k / n
    condition <- sqrt(n) * abs(p_hat - p) / sqrt(p_hat * (1 - p_hat)) <= z
    # Sumowanie iteracji
    co <- sum(dbinom(k, n, p) * condition)
    return(co)
}


p <- 0.5
alpha <- 0.05
n_values <- 10:100
co_probs <- sapply(n_values, function(n) wald_co_prob(n, p, alpha))

result <- data.frame(n = n_values, p_n = round(co_probs, 3))
print(result)
```

```
##      n   p_n
## 1   10 0.891
## 2   11 0.935
## 3   12 0.854
## 4   13 0.908
## 5   14 0.943
## 6   15 0.882
## 7   16 0.923
## 8   17 0.951
## 9   18 0.904
## 10  19 0.936
## 11  20 0.959
## 12  21 0.922
## 13  22 0.948
## 14  23 0.907
## 15  24 0.936
## 16  25 0.957
## 17  26 0.924
## 18  27 0.948
## 19  28 0.913
## 20  29 0.939
## 21  30 0.957
## 22  31 0.929
## 23  32 0.950
## 24  33 0.920
## 25  34 0.942
## 26  35 0.959
## 27  36 0.935
## 28  37 0.953
## 29  38 0.927
## 30  39 0.947
## 31  40 0.919
## 32  41 0.940
```

```
## 33  42 0.956
## 34  43 0.934
## 35  44 0.951
## 36  45 0.928
## 37  46 0.946
## 38  47 0.921
## 39  48 0.941
## 40  49 0.956
## 41  50 0.935
## 42  51 0.951
## 43  52 0.930
## 44  53 0.947
## 45  54 0.924
## 46  55 0.942
## 47  56 0.956
## 48  57 0.937
## 49  58 0.952
## 50  59 0.933
## 51  60 0.948
## 52  61 0.928
## 53  62 0.944
## 54  63 0.957
## 55  64 0.940
## 56  65 0.954
## 57  66 0.936
## 58  67 0.950
## 59  68 0.932
## 60  69 0.947
## 61  70 0.928
## 62  71 0.943
## 63  72 0.956
## 64  73 0.940
## 65  74 0.953
## 66  75 0.936
## 67  76 0.950
## 68  77 0.932
## 69  78 0.946
## 70  79 0.958
## 71  80 0.943
## 72  81 0.955
## 73  82 0.940
## 74  83 0.952
## 75  84 0.937
## 76  85 0.950
## 77  86 0.934
## 78  87 0.947
## 79  88 0.931
## 80  89 0.944
## 81  90 0.955
## 82  91 0.941
## 83  92 0.953
## 84  93 0.939
## 85  94 0.951
## 86  95 0.936
```

```
## 87  96 0.948
## 88  97 0.933
## 89  98 0.946
## 90  99 0.956
## 91 100 0.943
```

```r
plot(n_values, co_probs, type = "l",)
abline(h = 1 - alpha, col = "red", lty = 2)
```

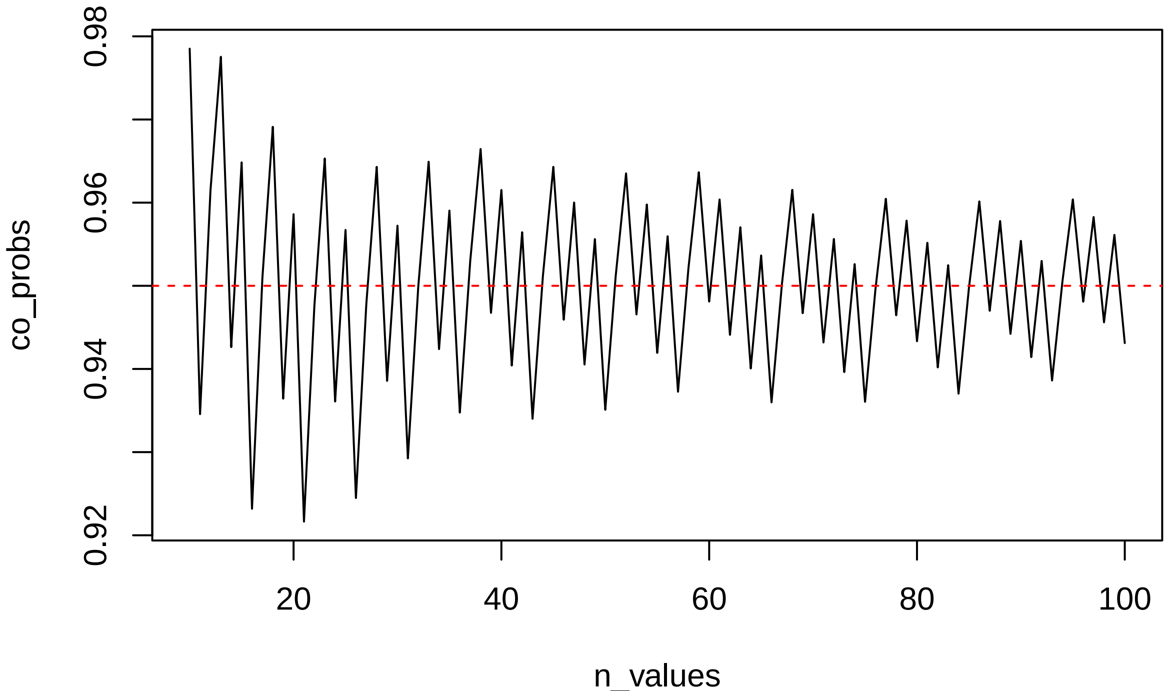



```r
wilson_co_prob <- function(n, p, alpha) {
    k <- 0:n
    int <- binom.wilson(k, n, conf.level = 1 - alpha)
    co <- sum(dbinom(k, n, p) * (int$lower <= p & p <= int$upper))
    return(co)
}

ac_co_prob <- function(n, p, alpha) {
    k <- 0:n
    int <- binom.confint(k, n, conf.level = 1 - alpha, method = "ac")
    co <- sum(dbinom(k, n, p) * (int$lower <= p & p <= int$upper))
    return(co)
}

lrt_co_prob <- function(n, p, alpha) {
    k <- 0:n
    int <- binom.lrt(k, n, conf.level = 1 - alpha)
    co <- sum(dbinom(k, n, p) * (int$lower <= p & p <= int$upper))
    return(co)
}
```

```r
co_probs <- sapply(n_values, function(n) wilson_co_prob(n, p, alpha))
ac_co_probs <- sapply(n_values, function(n) ac_co_prob(n, p, alpha))
lrt_co_probs <- sapply(n_values, function(n) lrt_co_prob(n, p, alpha))
```

```r
result <- data.frame(n = n_values, p_n = round(co_probs, 3))
result_ac <- data.frame(n = n_values, p_n = round(ac_co_probs, 3))
result_lrt <- data.frame(n = n_values, p_n = round(lrt_co_probs, 3))
```

```r
# Wykres dla Wilsona
plot(n_values, co_probs, type = "l")
abline(h = 1 - alpha, col = "red", lty = 2)
```



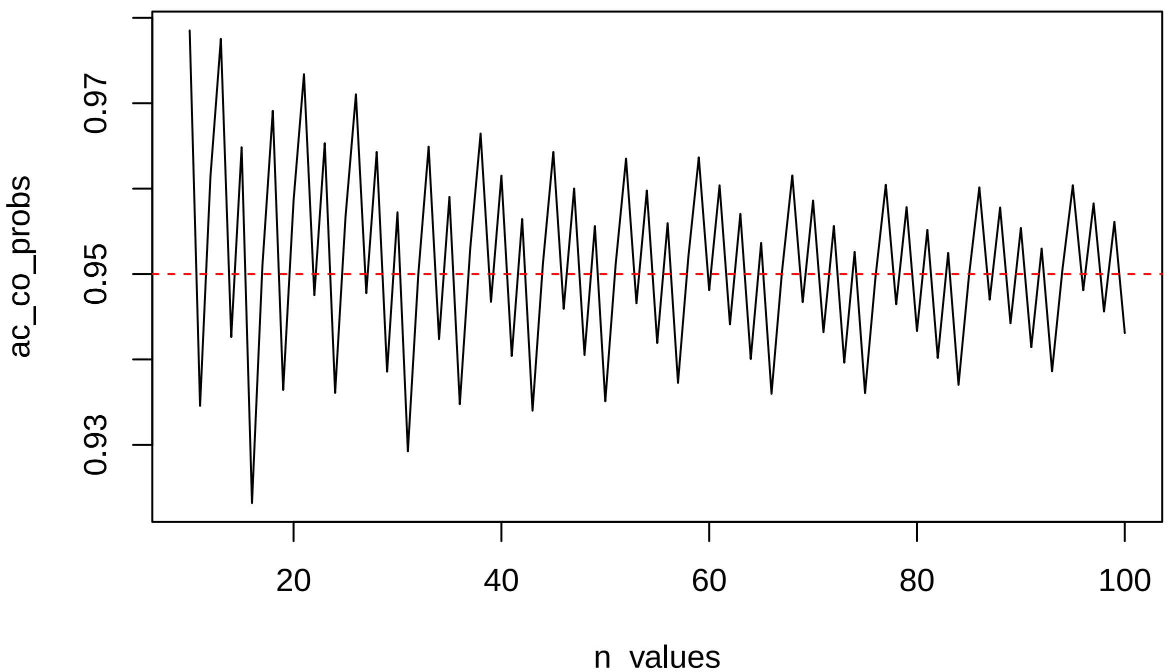

```r
print(result)
```

```
##      n   p_n
## 1   10 0.979
## 2   11 0.935
## 3   12 0.961
## 4   13 0.978
## 5   14 0.943
## 6   15 0.965
## 7   16 0.923
## 8   17 0.951
## 9   18 0.969
## 10  19 0.936
## 11  20 0.959
## 12  21 0.922
## 13  22 0.948
## 14  23 0.965
## 15  24 0.936
## 16  25 0.957
## 17  26 0.924
## 18  27 0.948
## 19  28 0.964
## 20  29 0.939
## 21  30 0.957
```

```
## 22  31 0.929
## 23  32 0.950
## 24  33 0.965
## 25  34 0.942
## 26  35 0.959
## 27  36 0.935
## 28  37 0.953
## 29  38 0.966
## 30  39 0.947
## 31  40 0.962
## 32  41 0.940
## 33  42 0.956
## 34  43 0.934
## 35  44 0.951
## 36  45 0.964
## 37  46 0.946
## 38  47 0.960
## 39  48 0.941
## 40  49 0.956
## 41  50 0.935
## 42  51 0.951
## 43  52 0.964
## 44  53 0.947
## 45  54 0.960
## 46  55 0.942
## 47  56 0.956
## 48  57 0.937
## 49  58 0.952
## 50  59 0.964
## 51  60 0.948
## 52  61 0.960
## 53  62 0.944
## 54  63 0.957
## 55  64 0.940
## 56  65 0.954
## 57  66 0.936
## 58  67 0.950
## 59  68 0.962
## 60  69 0.947
## 61  70 0.959
## 62  71 0.943
## 63  72 0.956
## 64  73 0.940
## 65  74 0.953
## 66  75 0.936
## 67  76 0.950
## 68  77 0.960
## 69  78 0.946
## 70  79 0.958
## 71  80 0.943
## 72  81 0.955
## 73  82 0.940
## 74  83 0.952
## 75  84 0.937
```

```
## 76  85 0.950
## 77  86 0.960
## 78  87 0.947
## 79  88 0.958
## 80  89 0.944
## 81  90 0.955
## 82  91 0.941
## 83  92 0.953
## 84  93 0.939
## 85  94 0.951
## 86  95 0.960
## 87  96 0.948
## 88  97 0.958
## 89  98 0.946
## 90  99 0.956
## 91 100 0.943
```

```r
# Wykres dla Agresti-Coull
plot(n_values, ac_co_probs, type = "l")
abline(h = 1 - alpha, col = "red", lty = 2)
```



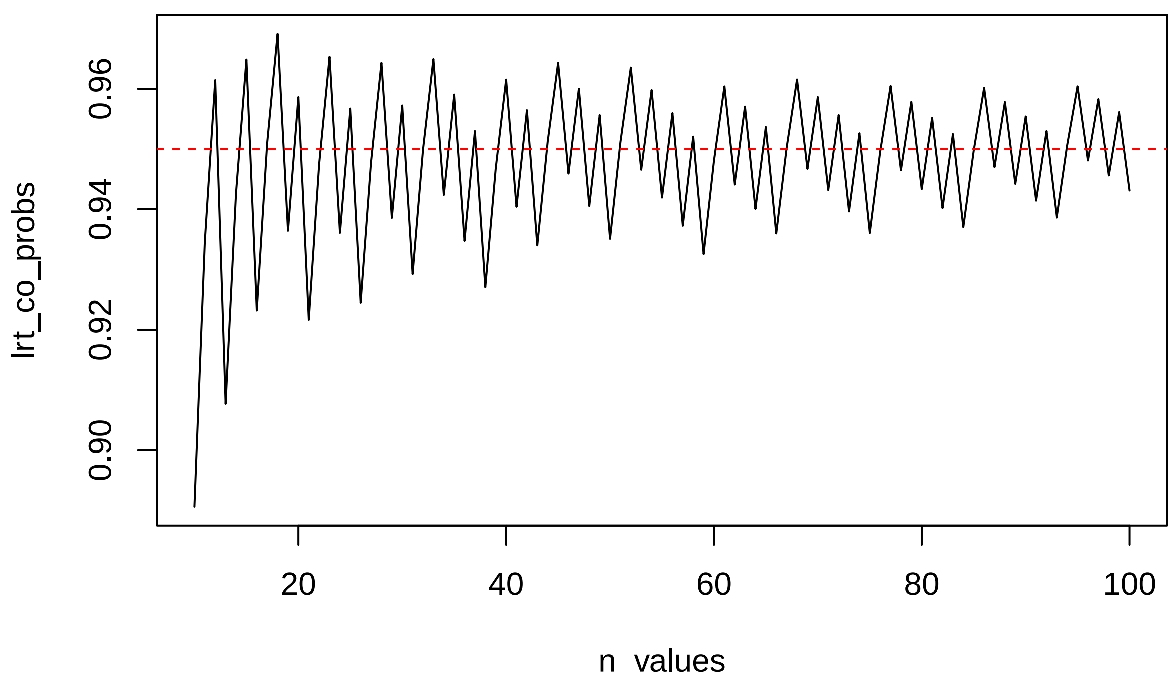

```r
print(result_ac)
```

```
##      n   p_n
## 1   10 0.979
## 2   11 0.935
## 3   12 0.961
## 4   13 0.978
## 5   14 0.943
## 6   15 0.965
## 7   16 0.923
## 8   17 0.951
## 9   18 0.969
```

```
## 10  19 0.936
## 11  20 0.959
## 12  21 0.973
## 13  22 0.948
## 14  23 0.965
## 15  24 0.936
## 16  25 0.957
## 17  26 0.971
## 18  27 0.948
## 19  28 0.964
## 20  29 0.939
## 21  30 0.957
## 22  31 0.929
## 23  32 0.950
## 24  33 0.965
## 25  34 0.942
## 26  35 0.959
## 27  36 0.935
## 28  37 0.953
## 29  38 0.966
## 30  39 0.947
## 31  40 0.962
## 32  41 0.940
## 33  42 0.956
## 34  43 0.934
## 35  44 0.951
## 36  45 0.964
## 37  46 0.946
## 38  47 0.960
## 39  48 0.941
## 40  49 0.956
## 41  50 0.935
## 42  51 0.951
## 43  52 0.964
## 44  53 0.947
## 45  54 0.960
## 46  55 0.942
## 47  56 0.956
## 48  57 0.937
## 49  58 0.952
## 50  59 0.964
## 51  60 0.948
## 52  61 0.960
## 53  62 0.944
## 54  63 0.957
## 55  64 0.940
## 56  65 0.954
## 57  66 0.936
## 58  67 0.950
## 59  68 0.962
## 60  69 0.947
## 61  70 0.959
## 62  71 0.943
## 63  72 0.956
```

```
## 64  73 0.940
## 65  74 0.953
## 66  75 0.936
## 67  76 0.950
## 68  77 0.960
## 69  78 0.946
## 70  79 0.958
## 71  80 0.943
## 72  81 0.955
## 73  82 0.940
## 74  83 0.952
## 75  84 0.937
## 76  85 0.950
## 77  86 0.960
## 78  87 0.947
## 79  88 0.958
## 80  89 0.944
## 81  90 0.955
## 82  91 0.941
## 83  92 0.953
## 84  93 0.939
## 85  94 0.951
## 86  95 0.960
## 87  96 0.948
## 88  97 0.958
## 89  98 0.946
## 90  99 0.956
## 91 100 0.943
```

```r
# Wykres dla ilorazu wiarygodności
plot(n_values, lrt_co_probs, type = "l",)
abline(h = 1 - alpha, col = "red", lty = 2)
```



```r
print(result_lrt)
```

```
##      n   p_n
## 1   10 0.891
## 2   11 0.935
## 3   12 0.961
## 4   13 0.908
## 5   14 0.943
## 6   15 0.965
## 7   16 0.923
## 8   17 0.951
## 9   18 0.969
## 10  19 0.936
## 11  20 0.959
## 12  21 0.922
## 13  22 0.948
## 14  23 0.965
## 15  24 0.936
## 16  25 0.957
## 17  26 0.924
## 18  27 0.948
## 19  28 0.964
## 20  29 0.939
## 21  30 0.957
## 22  31 0.929
## 23  32 0.950
## 24  33 0.965
## 25  34 0.942
## 26  35 0.959
## 27  36 0.935
## 28  37 0.953
## 29  38 0.927
## 30  39 0.947
## 31  40 0.962
## 32  41 0.940
## 33  42 0.956
## 34  43 0.934
## 35  44 0.951
## 36  45 0.964
## 37  46 0.946
## 38  47 0.960
## 39  48 0.941
## 40  49 0.956
## 41  50 0.935
## 42  51 0.951
## 43  52 0.964
## 44  53 0.947
## 45  54 0.960
## 46  55 0.942
## 47  56 0.956
## 48  57 0.937
## 49  58 0.952
## 50  59 0.933
## 51  60 0.948
```

```
## 52  61 0.960
## 53  62 0.944
## 54  63 0.957
## 55  64 0.940
## 56  65 0.954
## 57  66 0.936
## 58  67 0.950
## 59  68 0.962
## 60  69 0.947
## 61  70 0.959
## 62  71 0.943
## 63  72 0.956
## 64  73 0.940
## 65  74 0.953
## 66  75 0.936
## 67  76 0.950
## 68  77 0.960
## 69  78 0.946
## 70  79 0.958
## 71  80 0.943
## 72  81 0.955
## 73  82 0.940
## 74  83 0.952
## 75  84 0.937
## 76  85 0.950
## 77  86 0.960
## 78  87 0.947
## 79  88 0.958
## 80  89 0.944
## 81  90 0.955
## 82  91 0.941
## 83  92 0.953
## 84  93 0.939
## 85  94 0.951
## 86  95 0.960
## 87  96 0.948
## 88  97 0.958
## 89  98 0.946
## 90  99 0.956
## 91 100 0.943
```

Wykres dla ilorazu wiarygodności wydaje się mieć najmniejsze wahania