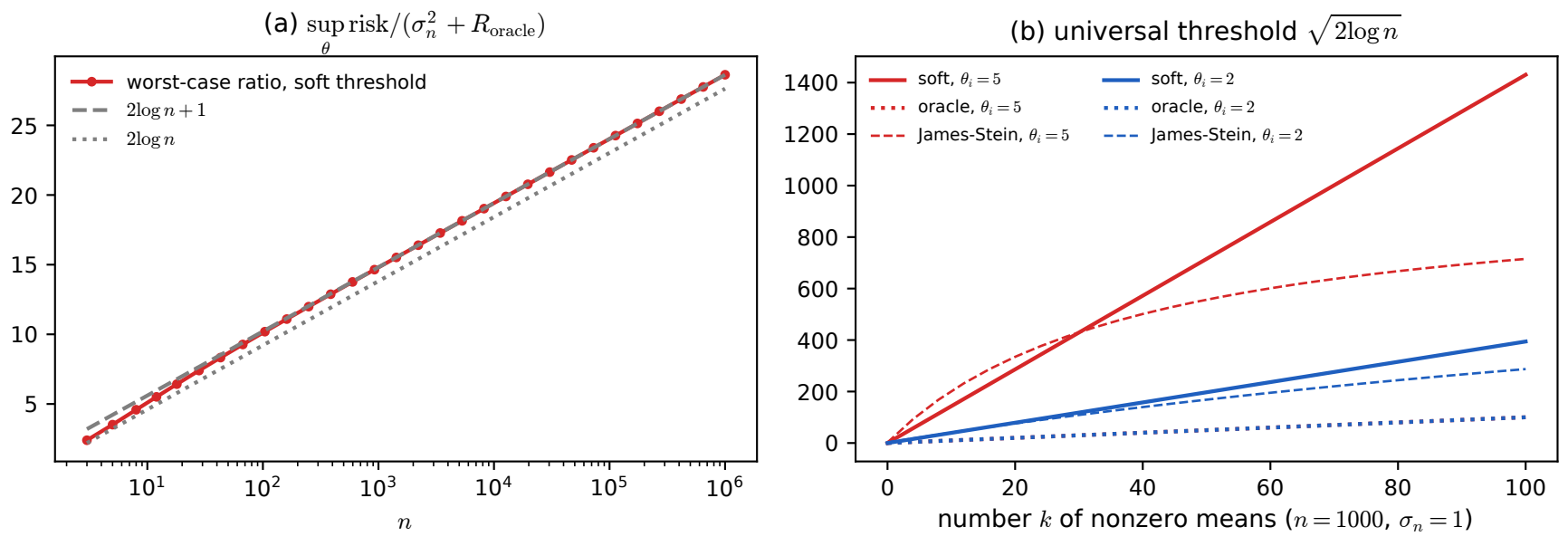

(a) $\sup_\theta \text{risk}/(\sigma_n^2 + R_{\text{oracle}})$
worst-case ratio, soft threshold
$2\log n + 1$
$2\log n$
25
20
15
10
5
10^1
10^2
10^3
10^4
10^5
10^6
n
(b) universal threshold $\sqrt{2\log n}$
soft, $\theta_i = 5$
oracle, $\theta_i = 5$
James-Stein, $\theta_i = 5$
soft, $\theta_i = 2$
oracle, $\theta_i = 2$
James-Stein, $\theta_i = 2$
1400
1200
1000
800
600
400
200
0
0
20
40
60
80
100
number k of nonzero means ($n = 1000$, $\sigma_n = 1$)