BM25/Okapi Approximation
(Robertson et al. 94)

- Idea: Approximate $p(R=1|Q,D)$ with a simpler function that share similar properties

- Observations:
  - $\log O(R=1|Q,D)$ is a sum of term weights W_i
  - $W_i = 0$, if $TF_i = 0$
  - W_i increases monotonically with TF_i
  - W_i has an asymptotic limit

- The simple function is

$$W_i = \frac{TF_i(k_1+1)}{k_1+TF_i}\log\frac{p_i(1-q_i)}{q_i(1-p_i)}$$