Simulation Report 1

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Introduction

Suppose we have $z_i \sim N(0,1)$, $i = 1, 2$ under the null. Their correlation is ρ. We perform a one-sided test with rejection region $\Gamma = \{z \geq 1.645\}$.

We then estimate $FDR(\Gamma)$ by

$$\hat{FDR}(\Gamma) = \frac{\hat{\pi}_0 E[R^0(\Gamma)]}{R(\Gamma) \vee 1} \tag{1}$$

Empirical FDR vs Correlation

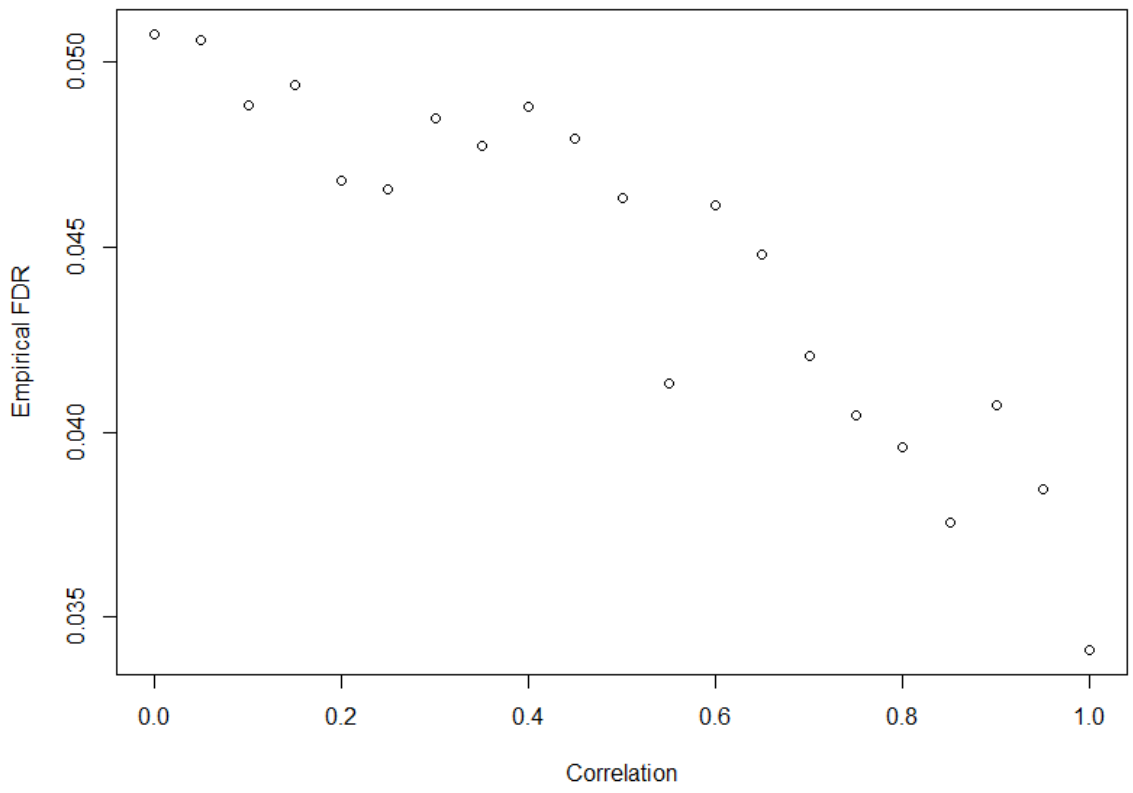

Figure 1: Empirical FDR vs. correlation when m=3

Variance of Empirical FDR vs Correlation

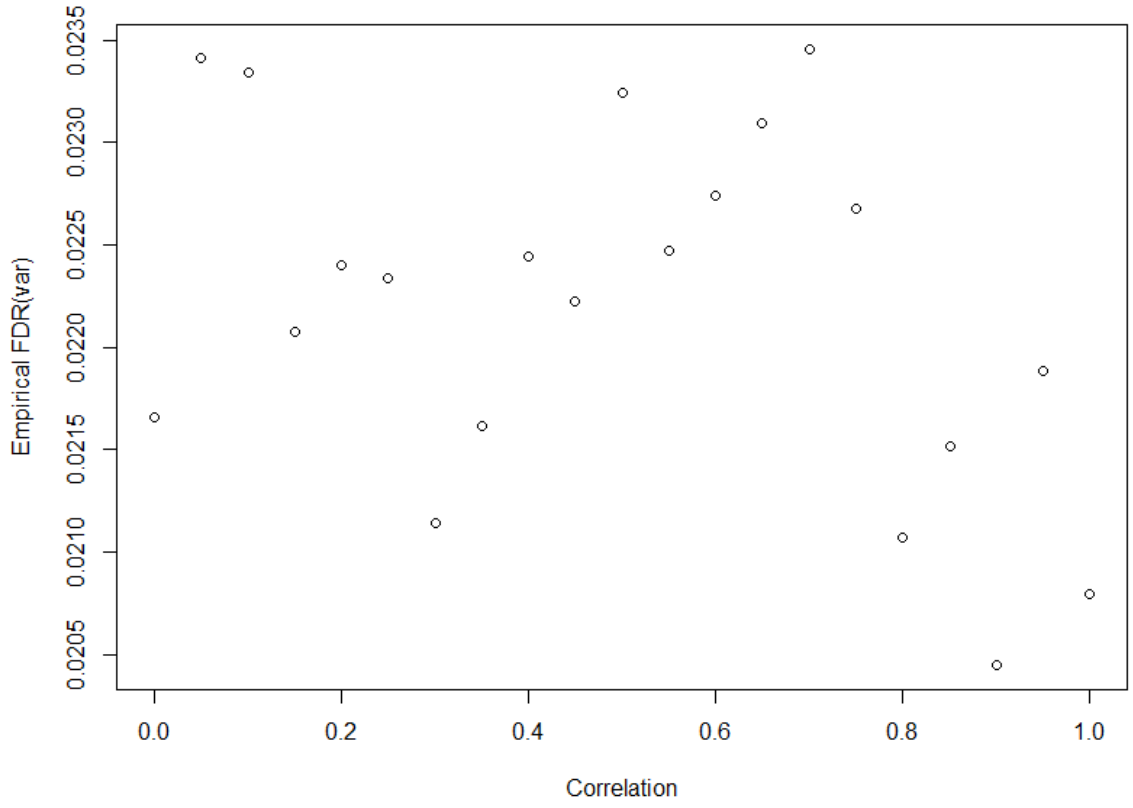

Figure 2: Variance Empirical FDR vs. correlation when m=3

Number of Rejections vs Correlation

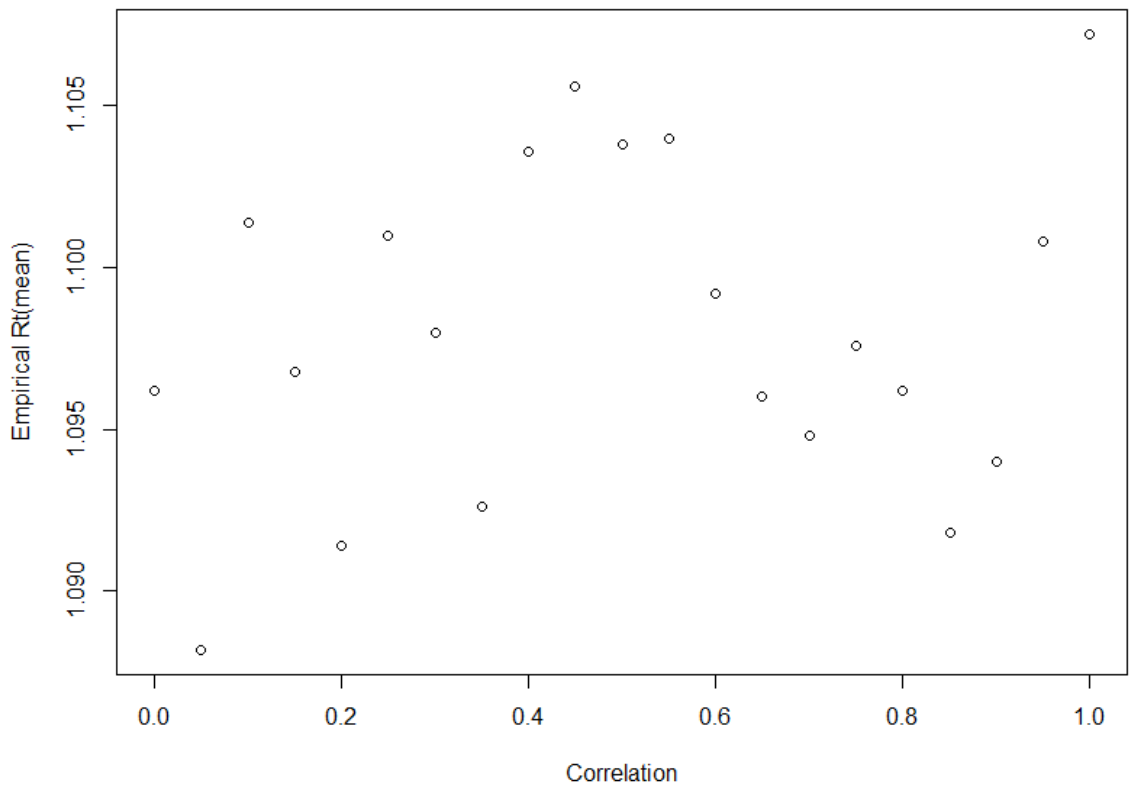

Figure 3: Number of Rejections vs. correlation when m=3

Variance of Number of Rejections vs Correlation

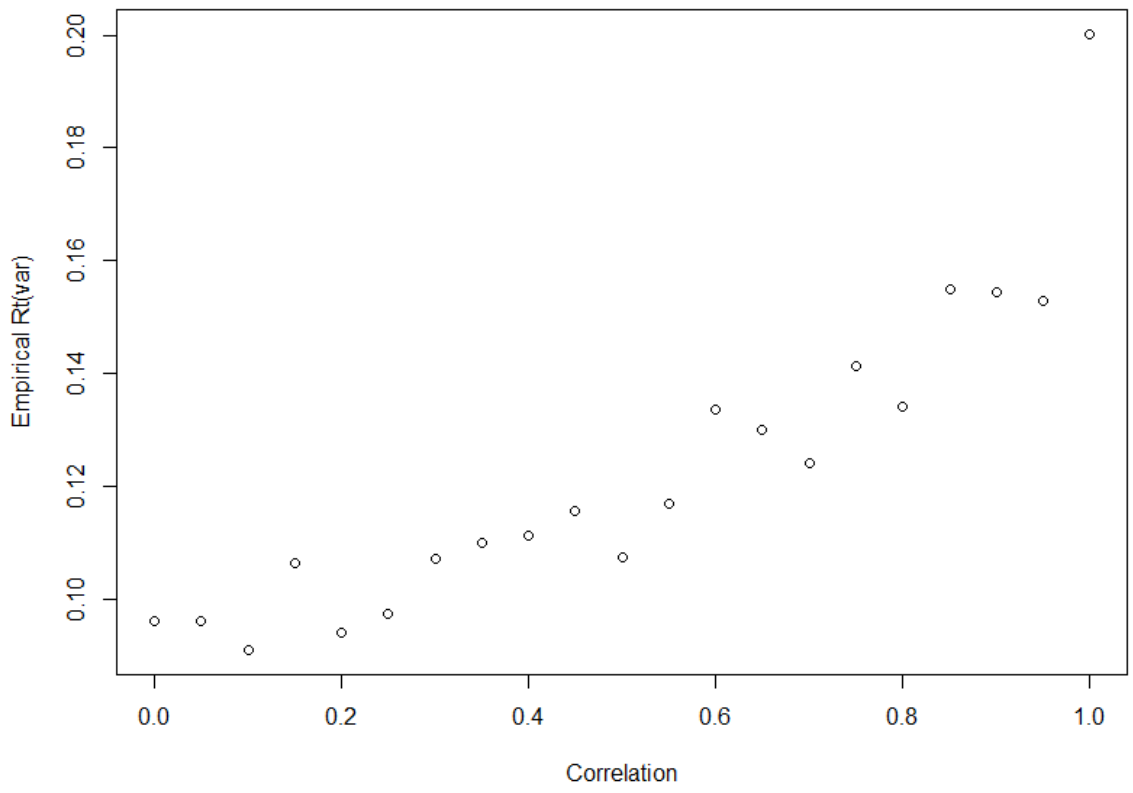

Figure 4: Variance of Number of Rejections vs. correlation when m=3

Compare E(V/R) with E(v)/E(R)

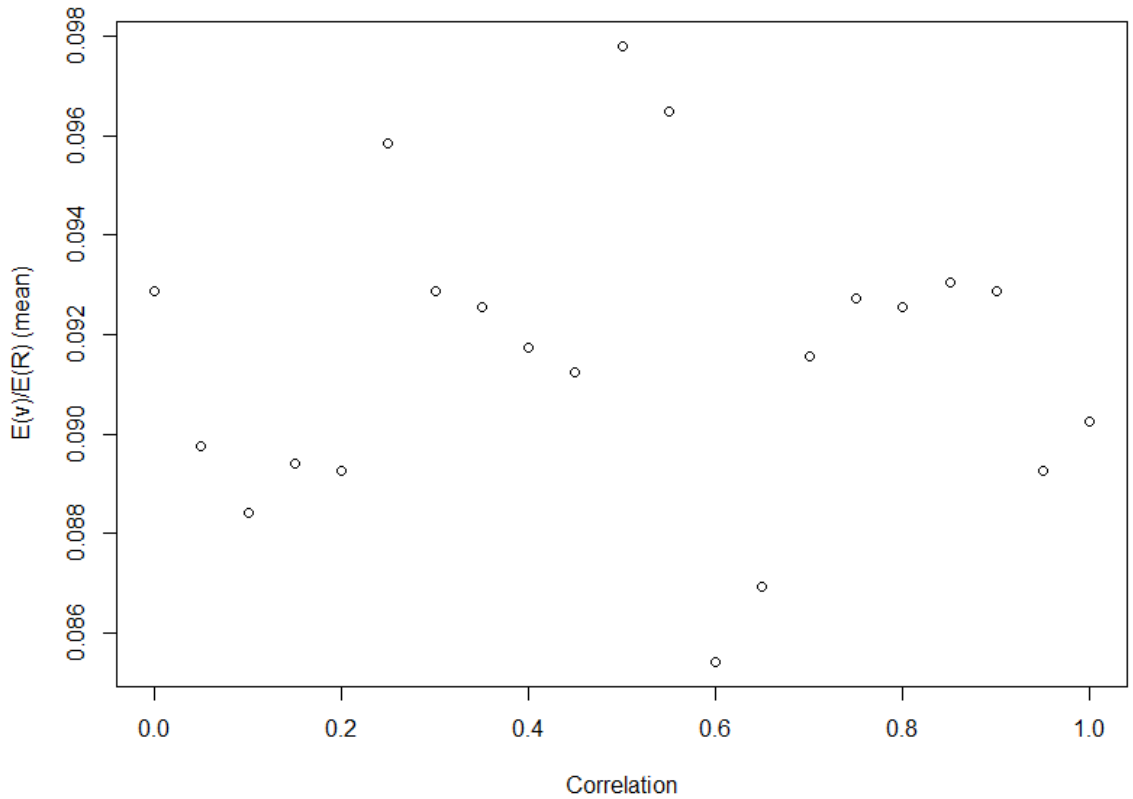

Figure 5: E(v)/E(R) vs. correlation when $m = 3$, $\mu_1 = 0.5$

Compare E(V/R) with E(v)/E(R)

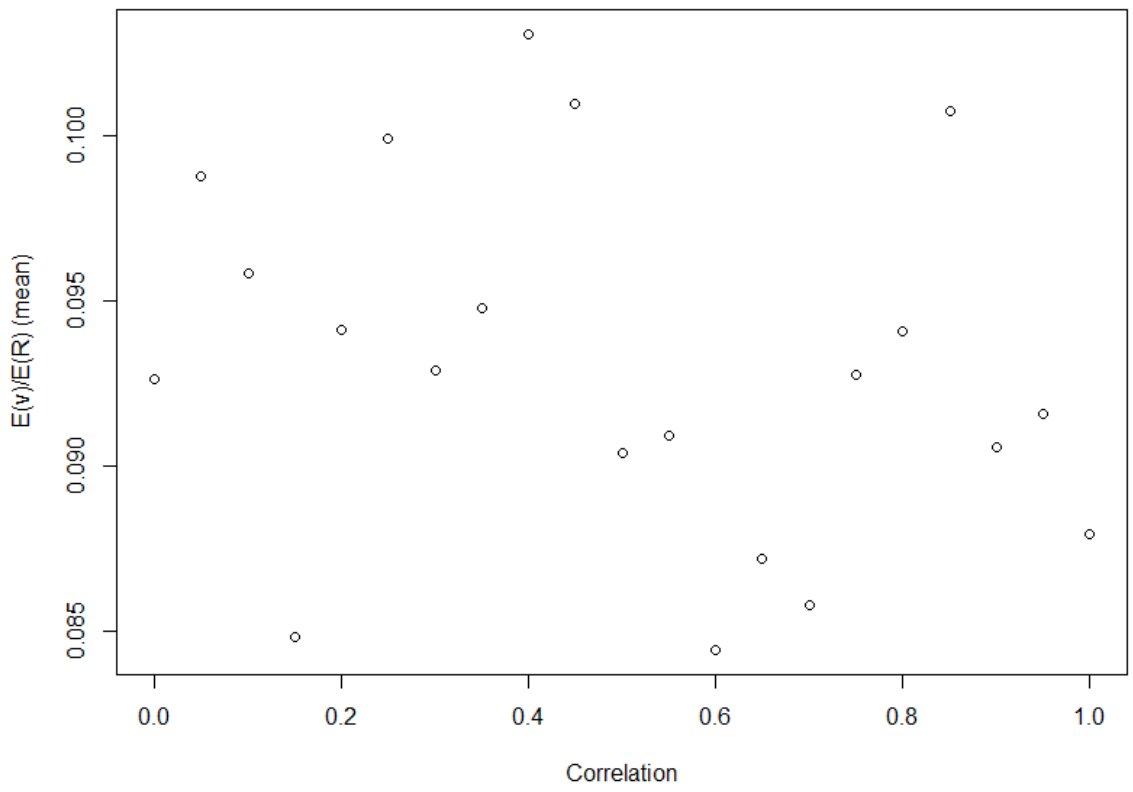

Figure 6: E(v)/E(R) vs. correlation when $m = 3$, $\mu_1 = 0.1$

Extend to m=100

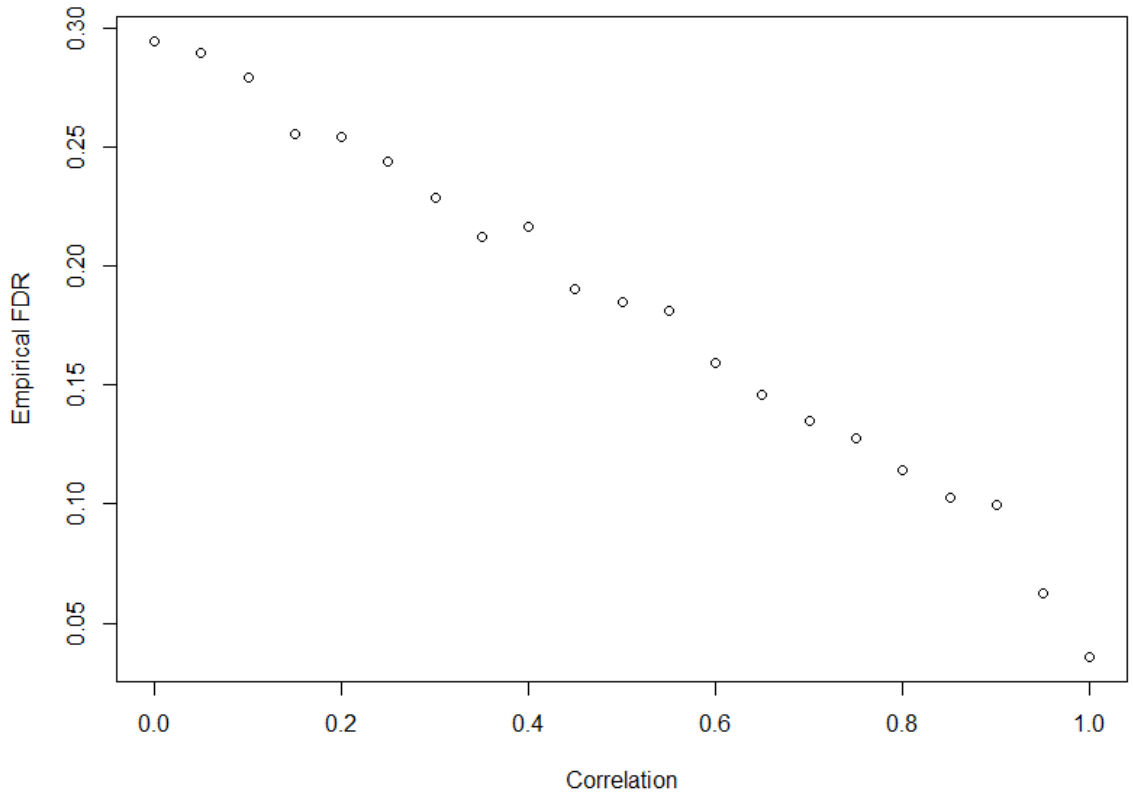

Figure 7: Empirical FDR vs. Correlation when $m = 100$, $\mu_1 = 0.5$

Extend to m=100

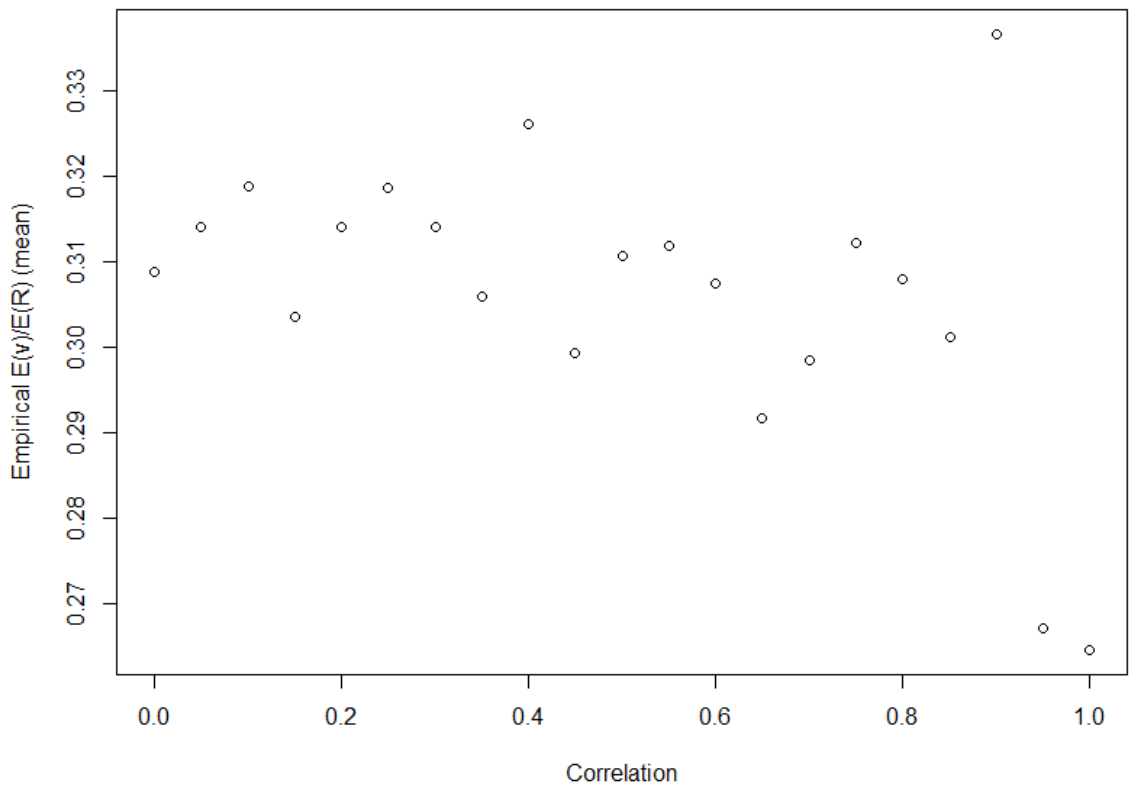

Figure 8: E(v)/E(R) vs. Correlation when $m = 100$, $\mu_1 = 0.5$

Extend to m=100

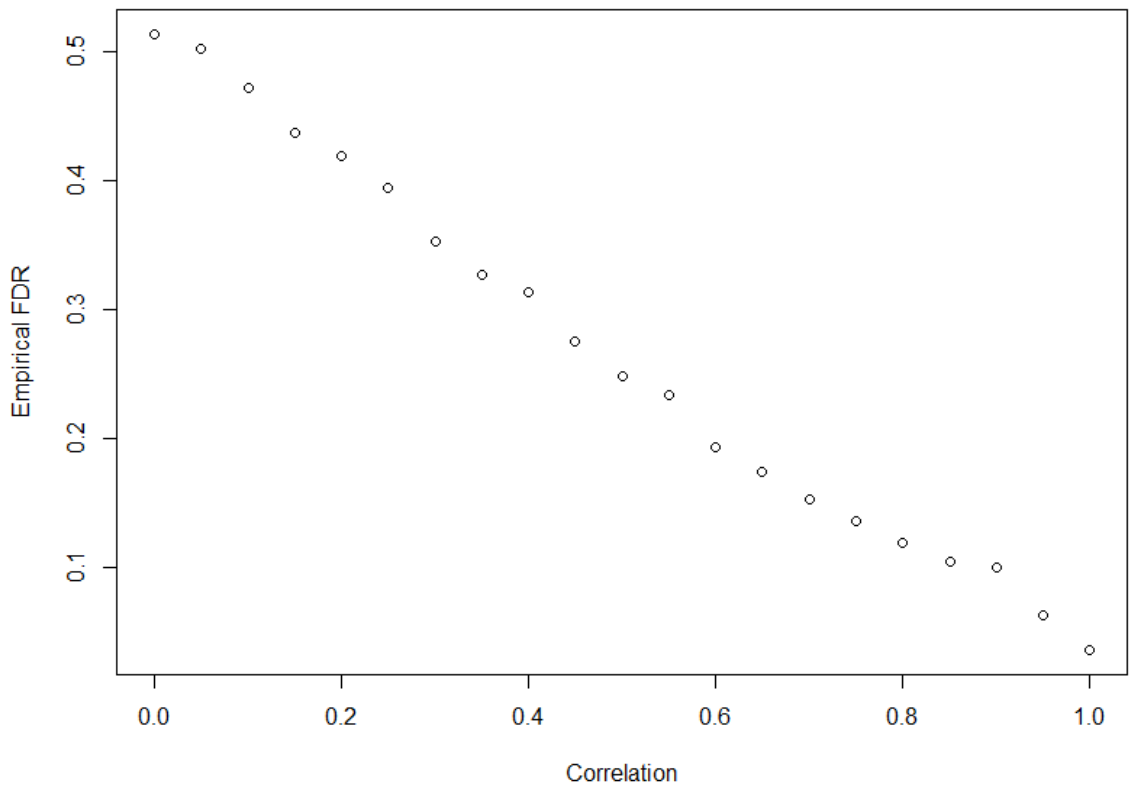

Figure 9: Empirical FDR vs. Correlation when $m = 100$, $\mu_1 = 0.1$

Extend to m=100

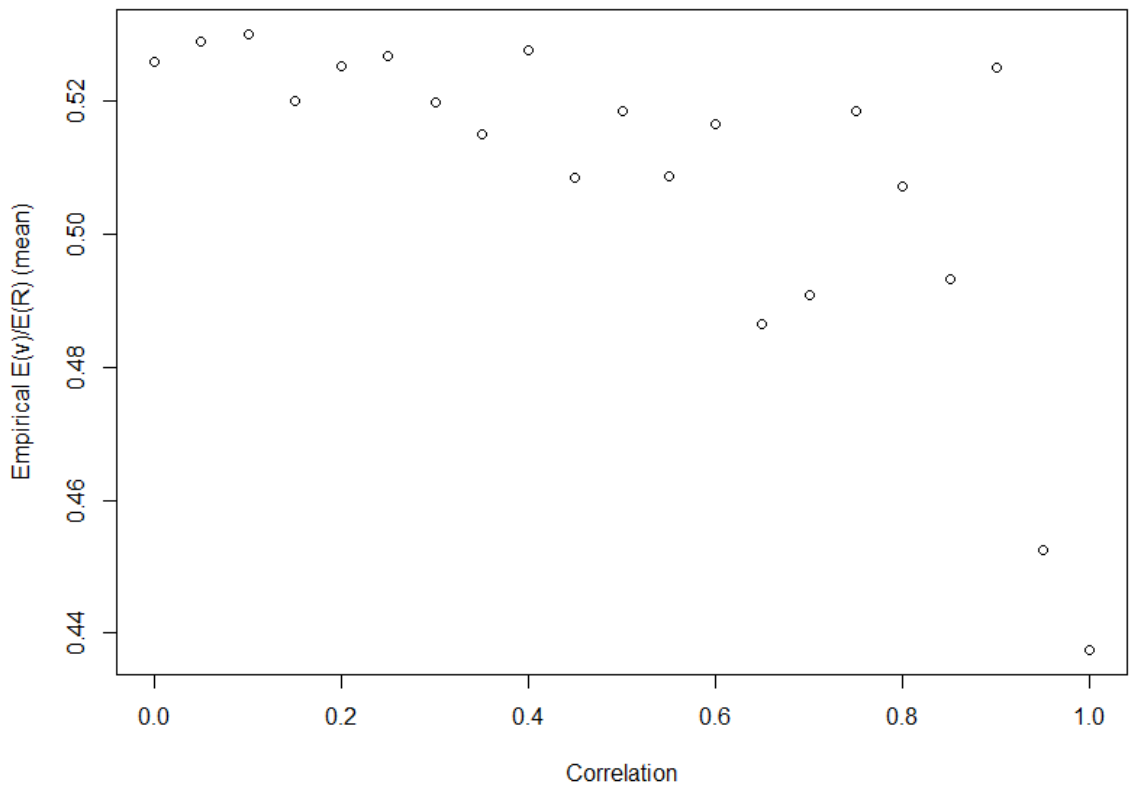

Figure 10: E(v)/E(R) vs. Correlation when $m = 100$, $\mu_1 = 0.1$