Q3 - Integral

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Arman Rezaei - 9723034

Assume $g(x) = x^6$ and X is normally distributed with pdf $f(X)$. We would like to calculate

$$E[g(x)] = \int_{-\infty}^{\infty} g(x)f(x)dx$$

If we have m random variates from $f(X)$, $X_1, \ldots, X_m$ then the above integral can be estimated using

$$\hat{\theta} = \frac{1}{m}\sum_{i=1}^{m} g(X_i)$$

[1]:
```
m <- 1000000
X <- rnorm(m)

g <- X^6
theta.hat <- mean(g)

theta.hat
```

14.8983022340722