Lab 1

1. $p \mid \underset{\sim}{X} \sim \text{Beta}(6, 5)$

i) R function : 'rbeta( )'

For the true density function, set a vector of p's:

> p.vec = seq(0, 1, length=100)

Then, 'dbeta( )' can be used for the density line.

ii) Set the simulated values of the odds using the definition : $\text{odds} = \frac{p}{1-p}$

iii) > sd( )

iv), v) Refer to the example codes above.

2. i) > pnorm( )

ii) > Var( ) for evaluating the quality of approximation.

iii) $P(Z \le 3) - P(Z \le 1)$

$= \int_1^3 \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}} dz$

3. i) For $X \sim \exp(\lambda)$, $F(x) = 1 - e^{-\frac{x}{\lambda}}$

Refer to the eg. in notes.

ii) $\int_0^\infty x^2 \sin(\pi x) \exp(-\frac{x}{2})\, dx = E[h(X)]$

4. Refer to the example 5 above.
(Rcodes)

Recall that a p.d.f $f(x) \geq 0$ & $\int_{x \in S} f(x)\, dx = 1$

Let $f(x) = N.C. \times \underbrace{\omega(x)}_{\text{kernel}}$

Then, $1/N.C. = \int \omega(x)\, dx$

5. Find the bound M first:

$$\frac{\frac{2}{5}(2 + \cos x)\, e^{-x}}{e^{-x}} \leq M.$$