MATH 598 - PROJECT 2

***Please upload a pdf with your solutions to myCourses by
10.00pm on Sunday 28th February.***

Construct Monte Carlo studies to illustrate the following properties of IPW estimators of the average treatment effect (ATE) for a binary treatment:

(a) The distribution of the propensity score influences the *variance* of the ATE estimator.

(b) Estimators based on $\widetilde{\mu}(z)$ have different *variances* to estimators based on $\widehat{\mu}(z)$.

(c) Mis-specification of a propensity score model can lead to *biased (and inconsistent)* estimation of the ATE.

(d) Estimation and use of a *parametric* propensity score model can improve the variance of an ATE estimator compared with using the *known* propensity score form.

(e) Propensity score models need only be constructed from *confounders* rather than all predictors.

For this project, you may focus on IPW rather than AIPW estimators. If appropriate, you may adapt R code from the `knitr` sheets from the course, but do not merely replicate the analysis contained in them.

25 MARKS