MATH 4824C - HW 1

Due on March 1st, 2024

Please (1) show the work to the questions and (2) upload your answers through Canvas.

1. Assignment 1.1 in textbook;
2. Justify the identifiable assumption for statistician B in Lord's paradox (page 17 in Chapter 1 of lecture notes); i.e. show that $\beta_g = E(Y(1) - Y(0)|G = 1) - E(Y(1) - Y(0)|G = 0)$ when $Y_i(0) = a + bX_i$;
3. Show that in randomized trials; i.e. $(Y_i(1), Y_i(0), X_i) \perp Z_i$, $E(Y_i(1)) = E(Y_i|Z_i = 1)$ and $(Y_i(1), Y_i(0)) \perp Z_i \mid X_i$;
4. Show that in randomized trials; i.e. $(Y_i(1), Y_i(0), X_i) \perp Z_i$, $E(Z_iY_i) = E(Z_iY_i(1))$ and $\sum Z_i(Y_i - \bar{Y}_1)^2/(n_1 - 1)$ is an unbiased estimator for $var(Y(1))$ where $\bar{Y}_1 = \sum Z_iY_i/n_1$ and $n_1 = \sum Z_i$.