HW 1

1 if we consider one-sided rejection region $S \geq 16$

(a) ~~R~~ level $= P_{H_0}(S \geq 16) \approx$ ~~0.0539~~ 0.1147

(under H_0, $S \sim$ binom$(n, \frac{1}{2})$).

(b) power $= P_{H_1}(S \geq 16)$.

Under H_1, $S \sim$ ~~biom~~ binom(n, p), where $p = P(X \geq 0) = P(N(0.5,1) \geq 0) \approx 0.69$.

So power $\approx$ ~~0.636~~ 0.7836

if we consider two-sided rejection region $S \geq 16$ or $S \leq 9$.

(a) level $= 2P_{H_0}(S \geq 16) \approx$ ~~0.108~~ 0.229

(b) power $= P_{H_1}(S \geq 16) + P_{H_1}(S \leq 4) \approx$ ~~0.037~~ 0.28

2 (a). p-value = 0.489.

Need to assume the ~~dts~~ differences follow the normal distribution.
Use QQplot the check normality.

(b) C.I. for pre-post: $[-2.78, 1.38]$.

(c). p-value = 0.115

(d) C.I. for y. $[-3, 1.65]$. Looks similar to the C.I. in (b).

3 (a). two sample t-test: p-value = $\begin{cases} 0.0944 \text{ (not assume equal variance)} \\ 0.0943 \text{ (assume equal var)} \end{cases}$.

Assumptions: ~~#~~ in each group, samples $\overset{iid}{\sim} N(\mu, \sigma^2)$.

conclusion: not reject H_0;

wilcoxon rank sum test: p-value = $\begin{cases} 0.147 & \text{without continuity correction} \\ 0.17 & \text{with continuity correction} \end{cases}$

assumptions. in each group, samples are i.i.d..
under alternative, assume the distributions of the two group differ only in location, but have the same shape.
conclusion: not reject H_0

(b) p-value = 0.0943. Exactly the same with that of the two-sample t-test with equal var.