Instructions: Answer each question as thoroughly as possible. Round answers to 4 decimal places as needed. Exact answers are best when possible. Be sure to answer all parts of each question.

1. Your company wants to improve sales. Past sales data indicate that the average sale was $112 per transaction. After training your sales force, the manager wants to be able to obtain a power of 80% at the level of a $25 improvement. Can they obtain that power from a sample of 25 salespeople? If not, how big a sample is needed? Assume that the old standard deviation (before training) was $13 and that this has not changed after training.

pwr package

pwr.t.test (n = 25, d = 25/13, sig.level = 0.05, power = NULL, type = "one.sample")

gives power = 1, so yes, they can obtain 80% from that

80% power needs only 5 people ~ the effect size is large

2. The table below shows the observed pollution indexes of air samples in two areas of a city. Test the hypothesis that the mean pollution indexes are the same for the two areas. (Use $\alpha = 0.05$.) Clearly state your hypotheses and state your conclusion in the context of the problem. Describe the kind of two-sample test you are conducting and why. Is the data approximately normally distributed?

Area A		Area B	
2.92	4.69	1.84	3.44
1.88	4.86	0.95	3.69
5.35	5.81	4.26	4.95
3.81	5.55	3.18	4.47

t.test (x, y, alternative = "two.sided")

independent

$H_0: \mu_1 = \mu_2$
$H_a: \mu_1 \neq \mu_2$

P-value is 0.1616
fail to reject Ho
the two areas are not different.

y is a little sketchier, but for the most part, yes, the data appears approximately normal

3. The table below show the incidence of bladder cancer in those who did and did not use a particular sweetener. Conduct a hypothesis test to determine if the two rates are significantly different. Clearly state your hypotheses and state your conclusion in the context of the problem. Be sure to test any assumptions.

$\hat{p}_1 = 129/374 \approx 0.344$
$\hat{p}_2 = 171/503 \approx 0.33996$

Sweetener	Bladder Cancer		
	Yes	No	
Used	129	245	374
Never Used	171	332	503
	300	577	877

$H_0: p_1 = p_2$
$H_a: p_1 \neq p_2$

Prop.test (x = c(129,171), n = c(374,503))

P = 0.9353
fail to reject Ho

They are not different.