Instructions: Show all work. Either use the formulas or the calculator to conduct the hypothesis tests. If you use your calculator, show both your input and output screens.

1. When testing gas pumps in Michigan for accuracy, fuel-quality enforcement specialists tested pumps and found that 1299 of them were not pumping accurately (within 3.3 oz. when 5 gal. was pumped), and 5686 were accurate. Use a 0.01 significance level to test the claim if a industry representative that less than 20% of Michigan gas pumps are inaccurate. From the perspective of the consumer, does the rate appear low enough?

$1299 + 5686 = 6985 = n$

1-PropZtest

$P_0 : .2$
$X = 1299$
$n = 6985$

prop $< p_0$
⇓

$Z = -2.93...$
$P = .00168...$ ⟸ less than .01 so reject H_0.
$\hat{p} = .1859...$

$H_0 : p_0 \geq .2$
$H_1 : p_0 < .2$

Industry rep's claim is true, but 20% is a high error rate and we have no info about how bad the errors were.

Consumers should still be pretty unhappy.

2. When 40 people used the Weight Watchers diet for one year their mean weight loss was 3.0 lbs. Assume the standard deviation of the population is $\sigma = 4.9$ lbs. and use a 0.01 significance level to test the claim that mean weight loss is greater than 0. Based on these results, does the diet appear to be effective? Does it appear to have practical significance?

ZTest (Stats)

$\mu_0 = 0$
$\sigma = 4.9$
$\bar{X} = 3$
$n = 40$

$\mu > \mu_0$
⇓

$Z = 3.872$
$P = 5.39 \times E-5$ ⟸ less than .01
$\bar{X} = 3, n = 40$ reject H_0

$H_0 : \mu \leq 0$
$H_1 : \mu > 0$

This program does appear to be effective for weight loss, but 3 lbs. per year isn't very much. Practically, this seems of little value.