

**Problem 1:** Based on the data given in each row of the table below, determine whether one should accept or reject  $H_0$ . Place a check mark in the appropriate column to indicate your choice.

$H_0$	$H_a$	Sign. Level, $\alpha$	Test Statistic, $z_x$	$p$ -value	Reject $H_0$	Fail to Reject $H_0$
$\mu = 101.3$	$\mu > 101.3$	0.05	1.83	0.9664		
$\mu = 101.3$	$\mu > 101.3$	0.01	1.83	0.9664		
$\mu = 101.3$	$\mu < 101.3$	0.05	-1.52	0.0643		
$\mu = -27.11$	$\mu \neq -27.11$	0.01	2.37	0.9911		
$\mu = -27.11$	$\mu \neq -27.11$	0.05	-2.13	0.0166		

**Problem 2:** Engineers for a high efficiency truck company have designed upgrades to their previous NVOA truck model. They hoped their new design will greatly increase the efficiency of the truck from the previous model which was greatly praised for its 26.5 mpg fuel efficiency. The distribution of the fuel efficiency of the previous model was normal with mean 26.5 mpg and standard deviation 0.8 mpg. Testing 14 of the new vehicles, the engineers find that this sample had an average of 27.3 mpg fuel efficiency. The engineers want to test whether they have actually increased the efficiency of the car using a hypothesis test with a level of significance of 1%.

(a) State  $H_0$  and  $H_a$  below.

$$\begin{cases} H_0 : \\ H_a : \end{cases}$$

(b) The engineers want to be sure that their conclusions are correct. They compute the probabilities of possible conclusion errors. Using the above significance level, they calculated the power of their test against the possibility of  $\mu = 27.3$  was 0.877. Fill out the probabilities of the events in the table below.

	$H_0$ True	$H_0$ False
Reject $H_0$		
Fail Reject $H_0$		