

Name: Solution

1. Consider the following clock signal:

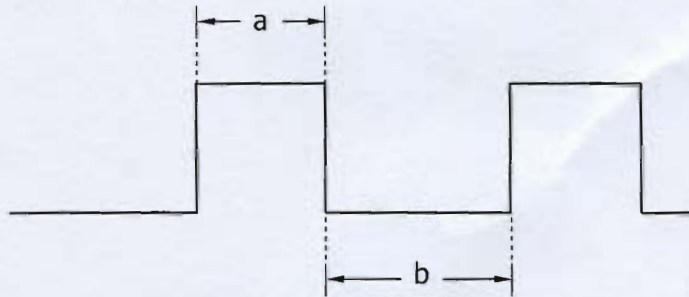


Figure 1, Clock Signal

a. (20 pts.) What is the duty cycle (%) of the waveform in Figure 1, where  $a=20$  ns and  $b=30$  ns.

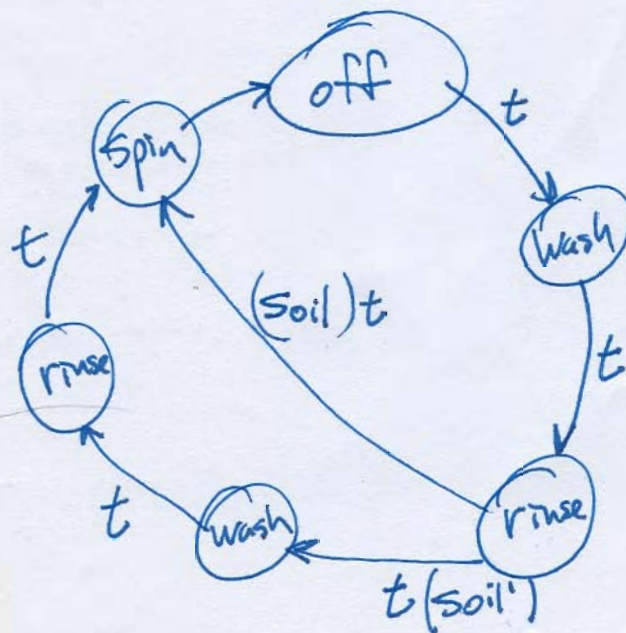
$$\text{Duty Cycle} = \frac{a}{a+b} * 100 = \frac{20}{50} * 100 = 40\%$$

10 pts = formula or an idea  
 10 pts = correct value

b. (20 pts.) Assume the waveform is cyclic - what is the period and frequency of this wave?

period = 50 ns,  $f = \frac{1}{50 \text{ ns}} = 20 \text{ MHz}$

2. (60 pts.) Write a finite state machine diagram for a washing machine that one input, a single button that identifies heavily soiled clothing. Regular washing has a wash, rinse and spin cycle, heavily soiled washing has two wash/rinse cycles and one spin. There is a 10 minute timer that identified the end of each cycle.



20 pts For trying  
 10 pts 6 states  
 10 pts flow between states  
 10 pts soil/soil' transition  
 10 pts t transition