

```
def control_flow_program(x):  
     $d_1$  = Beta(50, 7)  
     $\theta$  = sample(dist= $d_1$ )  
     $\mu$  = 0  
    while True:  
         $d_2$  = Categorical(prob=[1/5, 4/5])  
        b = sample(dist= $d_2$ )  
        if b:  
             $d_3$  = Normal(mean=0, std=1/2)  
            z = sample(dist= $d_3$ )  
        else:  
             $d_3$  = Normal(mean=2, std=1/2)  
            z = sample(dist= $d_3$ )  
         $\mu$  += z  
         $d_4$  = Categorical(prob=[1- $\theta$ ,  $\theta$ ])  
        c = sample(dist= $d_4$ )  
        if c:  
            break  
     $d_5$  = Normal(mean= $\mu$ , std=1)  
    observe(x, likelihood= $d_5$ )  
    return  $\theta$ 
```