

Name \_\_\_\_\_

1. A doctor prescribes an initial dose of 150 milligrams of some drug to be followed by a maintenance dose of 30 milligrams each day. Suppose that 10% of the amount of this drug in the bloodstream is eliminated via the kidneys each day. Let  $u(n)$  represent the number of milligrams of this drug in the patient's body  $n$  days after the initial dose.

(a) Determine a discrete dynamical system along with an initial value for  $u(n)$ .

(b) How many milligrams of this drug are in the bloodstream 5 days after the initial dose?

(c) After the initial dose, it takes between \_\_\_\_\_ and \_\_\_\_\_ days for the amount of drug in the bloodstream to reach a level of 250 milligrams.

(d) Assuming that the patient is to continue taking this drug for a long time, what was the doctor's **target goal** for the desired amount of this drug in the bloodstream?

2. Suppose that 40 milligrams of drug  $U$  and 60 milligrams of drug  $V$  are taken each day. The kidneys remove 30% of  $U$  and 20% of  $V$  each day. The liver metabolizes these drugs causing 8% of  $U$  to be converted into  $V$  and 5% of  $V$  to be converted into  $U$  each day. Let  $u(n)$  and  $v(n)$  represent the number of milligrams of  $U$  and  $V$ , respectively, in the bloodstream  $n$  days after the initial dose.

(a) Develop a discrete model to represent  $u(n)$  and  $v(n)$ .

(b) How many milligrams of  $U$  and  $V$  are in the bloodstream 6 days after the initial dose?