

### Translation Problems — WS 13

*Translate each of the following questions into functional notation.*

Two bicyclists, known only by their initials  $J$  and  $V$ , are travelling toward Astoria. The equations for the distance each has traveled after  $t$  hours are:

$$\begin{aligned}J(t) &= 20t + t^2 \\V(t) &= 10 + 30t - t^2\end{aligned}$$

1. How long does it take bicyclist  $J$  to travel 20 miles?
2. When are the two bicyclists 15 miles apart?

The  $TR$  and  $TC$  functions for a business are:

$$\begin{aligned}TR(q) &= 5q \\TC(q) &= -\frac{1}{5}q^2 + 5q + 10\end{aligned}$$

3. Find all quantities at which profit is \$10.
4. For what quantity  $q$  is marginal cost equal to \$3?

We have two mystery functions,  $f$  and  $g$ . Their equations are:

$$\begin{aligned}f(x) &= 3x - x^2 + a \\g(x) &= x^2 - 6x + 9\end{aligned}$$

Here  $a$  represents an unknown number.

5. At what  $x$ -values do the graphs of  $f$  and  $g$  cross?
6. For what values of  $x$  is  $g(x)$  is less than 7?

A rock and feather are falling. The equations for their heights are:

$$\begin{aligned}R(t) &= 5 - 5t^2 \quad (\text{rock}) \\F(t) &= d - t \quad (\text{feather})\end{aligned}$$

Here  $d$  represents an unknown number.

7. When does the rock hit the ground?
8. How high is the feather when the rock hits the ground?

The concentration of a drug in the bloodstream after  $t$  hours is given by  $C(t) = 20 - t^2$  ( $\mu\text{g/mL}$ ).

9. When is the concentration equal to 10  $\mu\text{g/mL}$ ?
10. When is the concentration equal to half the starting concentration?