DATE: _____

For each problem, find the particular solution of the differential equation.

1. $f'(x) = x^2,\ f(0) = 1$

2. $f'(x) = -\sin x,\ f(\pi) = 3$

3. $f''(x) = x^2,\ f'(0) = 6,\ f(0) = 3$

4. The rate of growth $\frac{dP}{dt}$ of a population of bacteria is proportional to the square root of t, where P is the population size and t is the time in days ($0 \le t \le 10$). That is,

$$\frac{dP}{dt} = k\sqrt{t}\ .$$

The initial size of the population is 500. After 1 day the population has grown to 600. Estimate the population after 7 days.