5. (9 points) The number of socks you own decreases according to the number of loads of laundry you've done since the beginning of the school year. After your first load of laundry you have 10 pairs of socks remaining and after 20 loads you are down to your last pair of socks. Find an exponential function that models this situation, and approximate the number of pairs of socks that you had when you started the semester. Interpret your approximation into a reasonable answer, and express your answer in a sentence. [Show your work!]

One can begin by noting that we are actually given that the number of socks decreases exponentially, not the number of pairs. However, since the number of socks is just twice the number of pairs, we also have that the number of pairs decreases exponentially.
Let P be the number of pairs of socks, P_0 the initial number of pairs you own, and n the number of loads of laundry you've done. Then we have the equation $P = P_0e^{kn}$ for a constant k. We are then given that $10 = P_0e^k$ and $1 = P_0e^{20k}$. Dividing these we obtain $\frac{1}{10} = e^{19k}$, which gives us that $k = -0.12$.
Then we can plug this back into $10 = P_0e^k$ to get that $P_0 = 11.28$. However, as we are talking about pairs of socks and one can't really have .28 pairs of socks, we conclude that you started with 11 pairs of socks.
[Note: This problem can also be worked with the equation in the form of $P = P_0a^n$.]