Mathematics 172 Homework

Duckweed is growing in a small pond in my yard. If $P(t)$ is the number of grams of duckweed in the pond after t weeks, it grows logistically according to the logistic equation.

$$\frac{dP}{dt} = .5P\left(1 - \frac{P}{800}\right)$$

1. Plot $\frac{dP}{dt}$ as a function of P for $0 \leq P \leq 800$. In calculator terminology this means you want to plot `\Y1 = .5X(1-X/800)`. What is the largest that $\frac{dP}{dt}$ becomes? *Answer:* The maximum of $\frac{dP}{dt}$ is 100 and occurs when $N = 400$.

2. I decide to harvest the duckweed to feed to fish. What is the maximum rate at which I can harvest it without killing off the duckweed population? *Answer:* 100 grams/week.

3. If I harvest at a rate of 50 grams/week what is the new stable population size of the colony of duckweed? *Answer:* 682.84