1. (a) From the graph of \( C(q) \) we see that \( C(0) = 3000 \), so the fixed costs are $3000.

(b) We can use any two points on this line to obtain the slope. From the graph it is clear that the points \((0, 3000)\) and \((80, 5000)\) are on this line giving a slope of \( \frac{5000 - 3000}{80 - 0} = 25 \). The formula for the line is then \( C(q) = 25q + 3000 \).

(c) Since the company charges $100 per set, the revenue function is given by \( R(q) = 100q \). Its graph is a line which goes through the origin and the top right corner of the grid shown.

(d) If your graphs are drawn carefully, you can see that the break-even point occurs when the graphs intersect at \( q = 40 \). You can also set revenue equal to cost to obtain

\[
100q = 25q + 3000 \\
75q = 3000 \\
q = 40
\]

2. Since interest is compounded \textbf{continuously}, the amount in the account \( t \) years after the investment is given by \( A(t) = 800e^{0.045t} \). Plugging in \( t = 8 \) gives \( A(8) \approx $1146.66 \).

3. A function which grows exponentially can be written as \( A = A_0e^{kt} \).

\[
0.5A_0 = A_0e^{k \cdot 15} \\
0.5 = e^{15k} \\
\ln (0.5) = 15k \\
k = \frac{\ln (0.5)}{15} \approx -0.0462
\]

\[
A \approx A_0e^{-0.0462t}
\]

\[
0.08A_0 \approx A_0e^{-0.0462t} \\
0.08 \approx e^{-0.0462t} \\
\ln (0.08) \approx -0.0462t \\
t \approx \frac{\ln (0.08)}{-0.0462} \approx 54.7 \text{ days}
\]
4. For $t$ between 6.5 and 6.6,
\[
\Delta P = \frac{P(6.6) - P(6.5)}{6.6 - 6.5} \approx \frac{3198.59702 - 3229.228649}{0.1} \approx -306.32 \text{ people per year.}
\]

For $t$ between 6.5 and 6.51,
\[
\Delta P = \frac{P(6.51) - P(6.5)}{6.51 - 6.5} \approx \frac{3226.152332 - 3229.228649}{0.01} \approx -307.63 \text{ people per year.}
\]

For $t$ between 6.5 and 6.501,
\[
\Delta P = \frac{P(6.501) - P(6.5)}{6.501 - 6.5} \approx \frac{3228.920886 - 3229.228649}{0.001} \approx -307.76 \text{ people per year.}
\]

For $t$ between 6.5 and 6.5001,
\[
\Delta P = \frac{P(6.5001) - P(6.5)}{6.5001 - 6.5} \approx \frac{3229.197872 - 3229.228649}{0.0001} \approx -307.78 \text{ people per year.}
\]

From the few calculations above we estimate that $P'(6.5) \approx -307.8$ people per year. Thus in 6.5 years the model predicts that the population will be decreasing by 307.8 people per year.