Derivatives and the Shape of Their Graphs

Problem 1

Find the critical points of $f(x) = e^x x^2 - 8e^x$. Identify the open intervals on which f is increasing and decreasing. Find the functions local and absolute extreme values.

Problem 2

Determine the concavity of $y = 5 - cos(x)$ on the interval $[0, \pi]$.

Problem 3

For the function $f(x) = 5 - 8x^3 - x^4$ on $\mathbb{R}$ and for the function $g(x) = 2x - 8sin\left(\frac{x}{3}\right)$ on $[-8, 4]$ determine the following:

1)Find the critical points of the function.
2)Determine the intervals on which the function is increases and decreases.
3)Classify the critical points as relative maximums, relative minimums or neither.
4)Find the intervals on which the function is concave up and concave down.
5)Determine the inflection points of the function.
6)Using the information from steps (1) – (5) sketch the graph of the function.