MATH 211, MAJOR EXAM II

Q1)Find $\frac{dy}{dx}$ at the point $(0, 2)$, if $(x^2 + 2y)^3 = 2xy^2 + 64$.

Q2) A manufacturer of high quality calculators estimates that when x hundred calculators are produced, the total profit will be

$$P(x) = -0.0035x^3 + 0.07x^2 + 25x - 200$$

thousand dollars.

(a) Find the marginal profit function.

(b) Use the marginal profit to estimate the profit derived from the sale of the $11-$th unit.

(c) What is the actual profit derived from the sale of the $11-$th unit?

Q3) Consider the function $f(x) = x^4 + 8x^3 + 18x^2 - 8$.

(a) Find the domain of f and the y-intercept.

(b)Find all the critical points of f and the intervals where f is increase or decrease.

(c) Find the relative extrema points of f.

(d) Find all the inflection points of f and the intervals where f is concave upward or downward.

(e)Find the absolute minimum and absolute maximum of f on the interval $[-1, 2]$.

(f) Sketch the graph of f roughly indicating y-intercept, critical points and inflection points.

Q4) (a) Differentiate the function $f(x) = (2^x - xlog_6(x^2 + 1))^4$.

(b) Find an equation for the tangent line to the graph of $f(x) = x^2 + ln\sqrt{x+1}$ at the point where $x = 0$.