



The Sharp EL-531 calculator may be used on this test.
Show all of your work in the space provided.
The number of marks for each question is indicated in brackets.

Mark:

25

1. Find dy/dx by using implicit differentiation. Simplify your answer.

$$4y^5 - 3x^6y^2 + 6x^2 = 7 + 2\cos y$$

[4]

2. If Newton's Method were used to approximate a zero of $f(x) = x^2 - 98$ using an initial approximation of $x_1 = 10$, then compute the next approximation x_2 .

[2]

3. Consider the function $f(x) = \frac{4x+4}{x^2}$. Its first two derivatives are $f'(x) = \frac{-4x-8}{x^3}$ and $f''(x) = \frac{8x+24}{x^4}$.

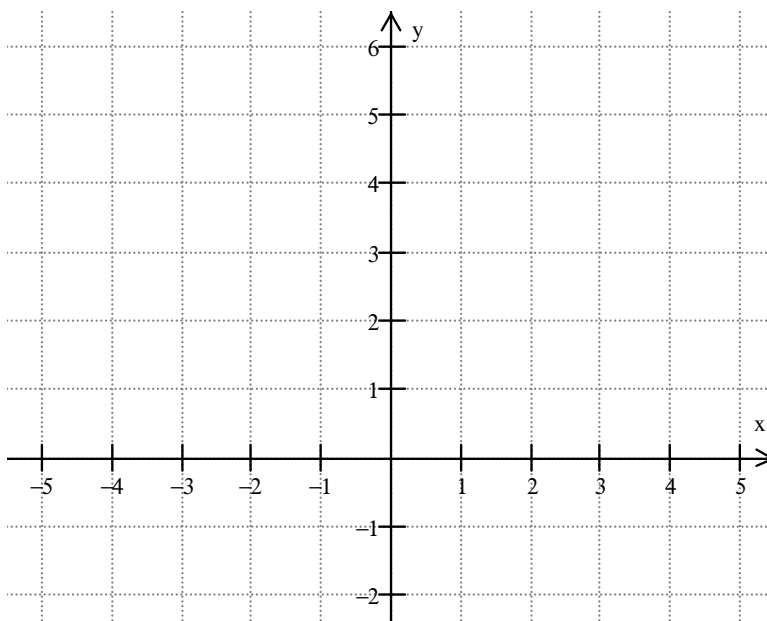
[9]

(a) Find the coordinates of all intercepts and the equations of all asymptotes.

(b) Find the intervals on which f is increasing or decreasing and find the coordinates of all critical points. Classify each critical point as a relative maximum, relative minimum or neither.

(c) Find the intervals on which the graph of f is concave upward or concave downward and find the coordinates of all inflection points.

(d) Use the above information and possibly extra points to sketch the graph of the function. Clearly label **all** intercepts, asymptotes, critical points and inflection points on your graph.

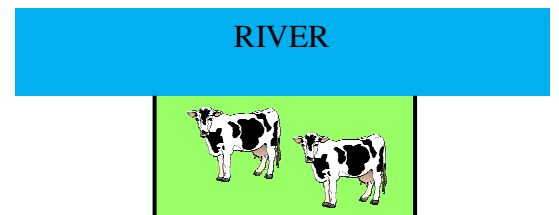


4. Find the **absolute** maximum and minimum values of the following function on the interval $[1, 2]$.

$$f(x) = x\sqrt{4-x^2}$$

[5]

5. A farmer wishes to fence a rectangular pasture for his herd of cows. One side of the pasture, which is to be adjacent to a river, requires no fencing. The total area of the pasture must be $125,000 \text{ m}^2$. What dimensions will require the least amount of fencing? Be sure to verify that your solution does give the absolute minimum.



[5]