

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Instructions: Though calculators can be used for the both questions, all problems require you to show your work. Any answer without proper justification will receive **ZERO** credit. Only **EXACT** answers will receive full credit unless otherwise noted. Proper Interval Notation must be used to receive credit.

1. Given  $g(x) = (x^2 - 1)e^x$ , on  $[-5, 5]$ , determine each of the following.

a. The local extrema values and where they occur.

b. The absolute extrema values and where they occur.

c. Intervals on which  $g(x)$  is i) Increasing:

ii) Decreasing:

d. The location of any points of inflection:

e. Intervals on which  $g(x)$  is i) Concave Up:

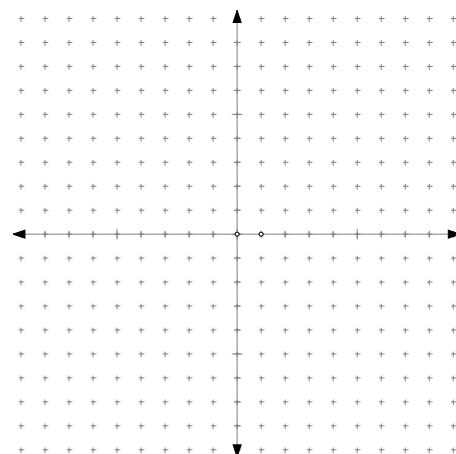
ii) Concave down:

f. Sketch the curve clearly showing

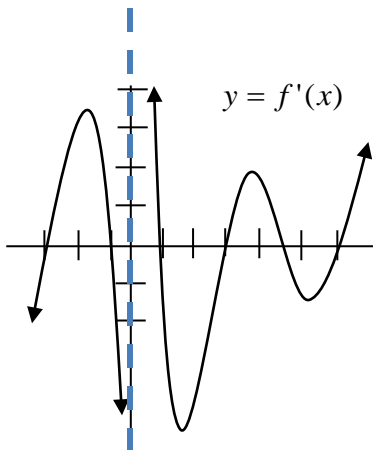
a) the intercepts

b) local and absolute extrema

c) Inflection points and concavity



2. For the following questions, refer to the graph of  $y = f'(x)$ , the **DERIVATIVE** of  $f(x)$ , show below. The domain of  $f(x)$  is all real numbers. Once again, this is the graph of the **DERIVATIVE!**



- Find all critical points of the **original function**  $f(x)$ .
- Estimate the intervals over which the **original function**  $f(x)$  is increasing.
- Estimate the intervals over which the **original function**  $f(x)$  is decreasing.
- Estimate the intervals over which the **original function**  $f(x)$  is concave up.
- Estimate the intervals over which the **original function**  $f(x)$  is concave down.
- Estimate the  $x$ -coord. of all local maximum points of the **original function**  $f(x)$ .
- Estimate the  $x$ -coord. of all the local minimum points of the **original function**  $f(x)$ .
- Estimate the  $x$ -coordinates of all inflection points of the **original function**  $f(x)$ .