

## 231 Gateway 3 Practice Test - Graphs

No uses of Calculators; No Partial Credit. 30 minutes to finish test. More space will be provided on the actual test.

1. (20 pts) Find the critical numbers and give the values of the absolute minimum and maximum for the function  $f(x) = 3x^4 + 8x^3 - 6x^2 - 24x$  on the interval  $[-1, 2]$ .

2. (10 pts) Find points where  $f$  has a local maximum or minimum on the given domain and identify each point as a local maximum or local minimum. If there is no local maximum or minimum, explain (briefly) why.

$$f(x) = x^2 + \frac{3}{x}, 0 < x < \infty.$$

3. (28 pts) For the given derivative of a function  $f$ ,  $f'(x) = (x + 1)(x + 2)$ ,

(a) What are the critical numbers of  $f$ ?

(b) On what intervals is  $f$  increasing?

(c) On what intervals is  $f$  decreasing?

(d) At what points, if any, does  $f$  assume a local maximum or local minimum values?

4. (12 pts) The graphs of the first and second derivative of a function  $y = f(x)$  are shown. Add to the picture a sketch of the approximate graph of  $f$ , given that the graph passes through the point P.



