

**Problem 1.** Find

- (a) Critical points
- (b) Where the function is positive
- (c) Where the function is increasing or decreasing
- (d) Where the function is concave up or concave down
- (e) Locate any points of inflection
- (f) Locate any relative extrema

for

1.  $f(x) = \frac{x^3}{3} + x^2 + x$
2.  $g(x) = \frac{x^2}{x+1}$
3.  $e^{2x}(x-1)$

**Problem 2.** If they exist, find the absolute extrema of the following functions on the indicated intervals.

1.  $f(x) = -e^{-x}(x+2)$  on  $[-3, 3]$

**Problem 3.** Sketch a graph of the function  $f(x) = \frac{x}{x+1}$ .