

WEEKLY HOMEWORK #3 — DUE FRIDAY, JANUARY 22

1. Using the techniques from section 3.5, sketch the graph of

$$f(x) = \frac{12x^2 + 36}{(x + 3)^2}.$$

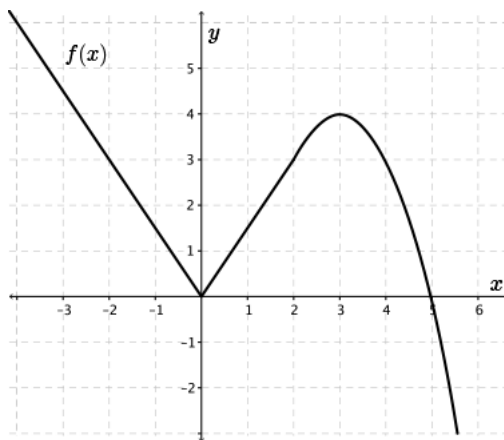
Label the axes with tick marks. Be sure to label the coordinates of every important feature, including inflection points and asymptotes, and explain how you found them.

Hint 1. If you are doing the problem right, then the coordinates of the important features will all be integers (*i.e.* no fractions).

Hint 2. This problem will be easier if you leave the denominator in factored form; for example, you should keep it as $(x + 3)^2$ instead of writing it like $x^2 + 6x + 9$.

Hint 3. After you find f' , simplify it before you try to solve it. Same thing for f'' .

2. (*Problem 3.7.8 from the textbook.*) Using calculus, find the height and width of a rectangle with area 1000 whose perimeter is as small as possible.
3. Let f be the function with this graph:



- (a) Using the graph of f , describe f' on the interval $(-4, 0)$, and describe f' on the interval $(0, 2)$.
- (b) What can you say about $f'(0)$?
- (c) On what interval(s) is f increasing? On what interval(s) is f decreasing?
- (d) On what interval(s) is f concave up? On what interval(s) is f concave down?
- (e) What can you say about f' using your answers to (c) and (d)?
- (f) Draw the graph of f' .