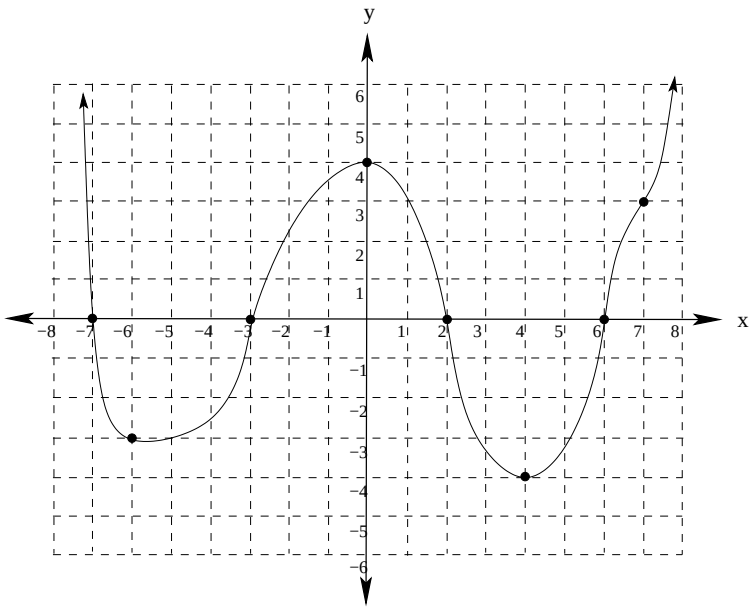
1. Consider the graph below. Determine the intervals where $f(x)$ is concave up, and concave down, and find the $x$-coordinates of any inflection points assuming:

   (a) The graph shown represents $f(x)$

   (b) The graph shown represents $f'(x)$

   (c) The graph shown represents $f''(x)$




2. Given that a function $g(x)$ is increasing and concave down, $g(0) = 1$, and $g(10) = 7$, what can you say about $g(5)$? In particular, what is the best lower bound you can find for $g(5)$?

3. On the grid provided below, sketch a graph for a function $f(x)$ that satisfies the following:

   Domain: $(-\infty,-3)\cup(-3,\infty)$; $x$-intercepts: $(-4,0),(-1,0)$, and $(3,0)$; $y$-intercept: $(0,-3)$

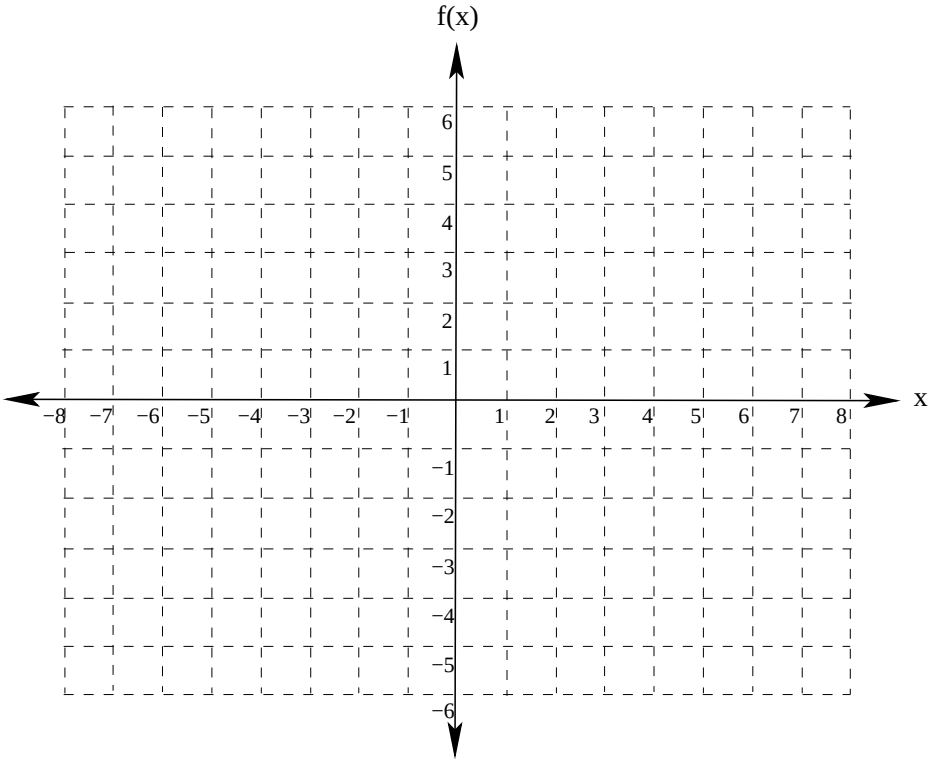
   Increasing on: $(-\infty,-3)\cup(0,2)\cup(5,\infty)$ ; Decreasing on: $(-3,0)\cup(2,5)$

   Concave up on: $(-6,-3)\cup(-3,-2)\cup(3,7)$; Concave down on: $(-\infty,-6)\cup(-2,3)\cup(7,\infty)$

   Local Max: $(2,1)$, Local Mins: $(0,-3)$ and $(5,-6)$;

   Inflection Points: $(-6,-2),(-2,1),(3,0)$, and $(7,-3)$

   $\lim_{x\to-\infty} f(x)=-\infty$; $\lim_{x\to+\infty} f(x)=-1$; $\lim_{x\to-3^-} f(x)=+\infty$; $\lim_{x\to-3^+} f(x)=+\infty$

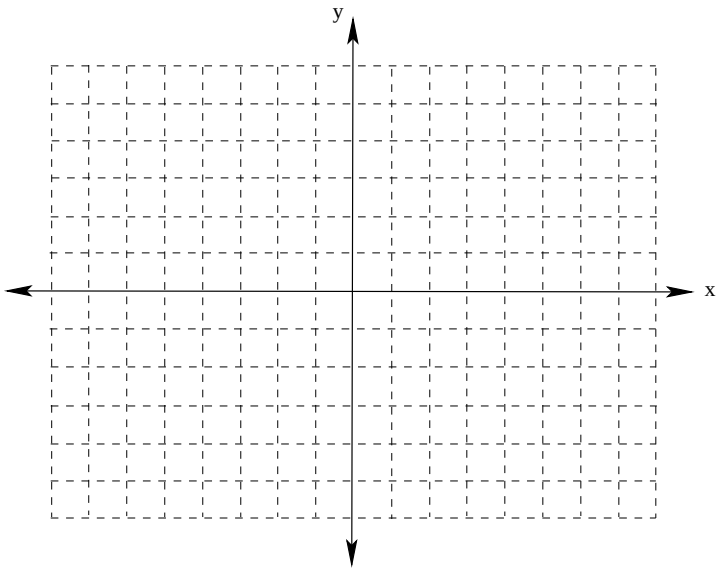



4. Let $P(t)$ represent the share price of a stock a time $t$. Record what each of the following statements tell you about the signs of the first and second derivatives of $P(t)$.

   (a) The price of the stock is rising faster and faster.

   (b) The price of the stock is close to bottoming out.

5. For the function $f(x) = x^3 - 3x^2$, find the $x$ and $y$-intercepts, any asymptotes, the intervals where it is increasing, decreasing, concave up, or concave down. Find all local extrema and inflection points. Finally, sketch the function on the grid provided.



6. For the function $f(x) = \dfrac{x}{x^2 - 4}$, find the $x$ and $y$-intercepts, any asymptotes, the intervals where it is increasing, decreasing, concave up, or concave down. Find all local extrema and inflection points. Finally, sketch the function on the grid provided.