

Please read directions carefully. Raise your hand if you are not sure what a problem is asking. You must explain your work thoroughly and unambiguously to receive full credit on questions or parts of questions designated as **Work and Answer**.

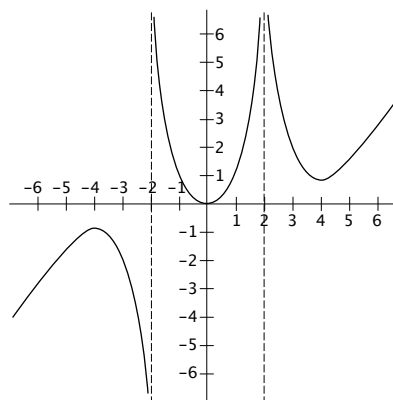
No calculators or notes are allowed on this quiz.

Please note that there is a problem on the back.

Multiple Choice. (6 points) Circle the letter of the best answer.

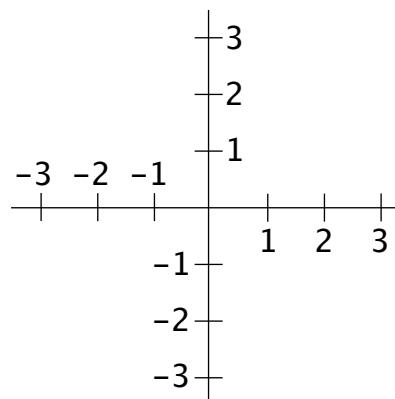
1. The function $g(x) = x^3 + 3x^2 - 9x + 1$, whose derivative is $g'(x) = 3x^2 + 6x - 9$,
- (a) has a local maximum at $x = 1$
 - (b) has a local minimum at $x = 1$
 - (c) has a critical number $x = 1$ which is neither a local maximum nor a local minimum.
 - (d) has an inflection point at $x = 1$

2. The function $f(x)$ pictured at right is
- (a) an even function
 - (b) an odd function
 - (c) neither an even nor an odd function



Graph. (8 points) On the axes below, sketch the graph of a function $f(x)$ satisfying all of the following:

- $f(x)$ is decreasing for all $x < 0$
- $f(x)$ is concave up for all $x < 1$
- $f(x)$ has an inflection point at $x = 1$
- $f(x)$ has a local maximum at $x = 2$



Work and Answer. (6 points) *You must show all relevant work to receive full credit.*

For the function $f(x) = \frac{1}{4}x^4 - x^3 + 7$, find the interval(s) on which $f(x)$ is increasing and the interval(s) on which $f(x)$ is decreasing.

You may show your results on a number line, but be sure to explain how you get your answers.