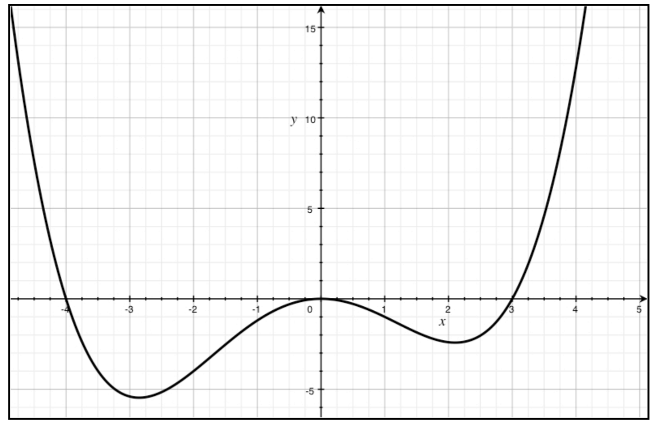
AP Calculus – Functions Practice Test

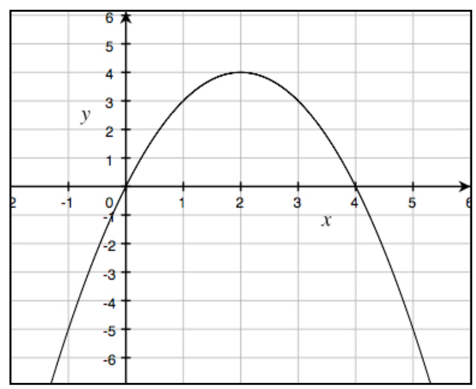
1. Show that Rolle's Theorem hold between $x = 0$ and $x = 1$ for $f(x) = x^3 - x + 5$.

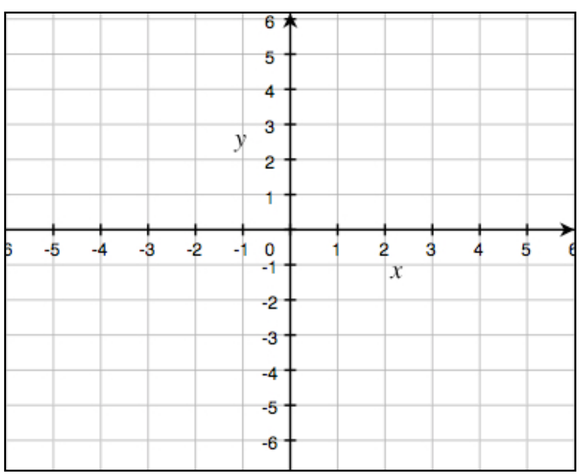
2. Below is a graph of $f(x)$. Place dots on the curve at the approximate locations that satisfy the mean-value theorem on [-4, 4].



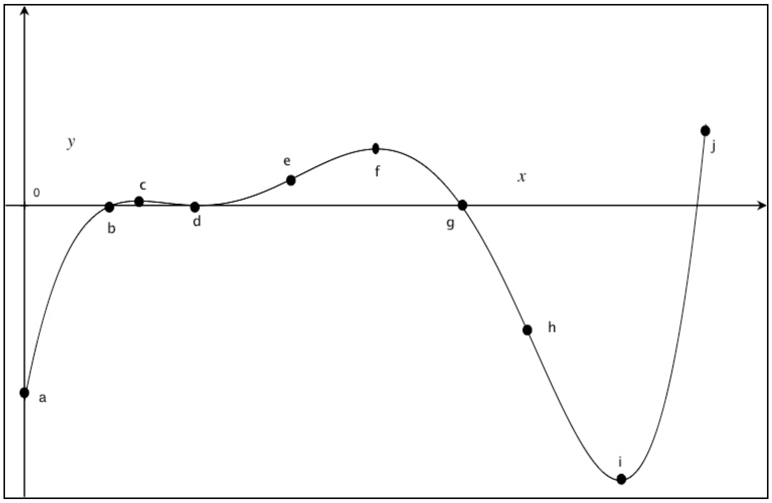
3. Find the value(s) of x that satisfy the mean-value theorem for $f(x) = 8x - x^2 + 1$ on [-1,3].

4. To the right is a graph of $f'(x)$. Determine what a graph of $f(x)$ might look like. Create sign charts to show your logic.



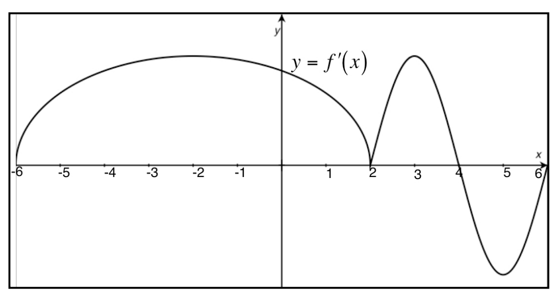


5. Below is a graph of $f(x)$ shown on an interval. The graph of f has a horizontal tangent at c, d, f, and i. In the chart, place either a positive sign (+), negative sign (-) or zero (0) at the points a – j for $f(x), f'(x)$ and $f''(x)$. If there is a relative minimum, relative maximum, absolute minimum, absolute maximum or possible inflection point on the interval at these points, put an x in the appropriate column.



Pt	$f(x)$	$f'(x)$	$f''(x)$	Inflection pt.	Relative minimum	Relative maximum	Absolute Minimum	Absolute Maximum
a								
b								
c								
d								
e								
f								
g								
h								
i								
j								

6. The figure to the right shows the graph of f', the derivative of the function f, for $-6 \le x \le 6$.



a) Find all values of x, for $-6 < x < 6$, at which f attains a relative maximum and relative minimum. Justify your answer.

b) Find all values of x, for $-6 < x < 6$, at which f has an inflection point. Justify your answer.

7. For the given function $f(x)=6x^2-x^3-1$, find the x-values where $f(x)$ attains a relative minimum, relative maximum, and inflection points, if any. Justify answers.

8. For the given function $f(x)=\dfrac{x^2+1}{x^2-16}$, find the intervals where the function is increasing and decreasing. Justify your answer.

9. Find the absolute maximum and absolute minimum values of $f(x)=x^3+6x^2+1$ on $[-5,3]$. Be sure to state both what the relative extrema are and where they occur.