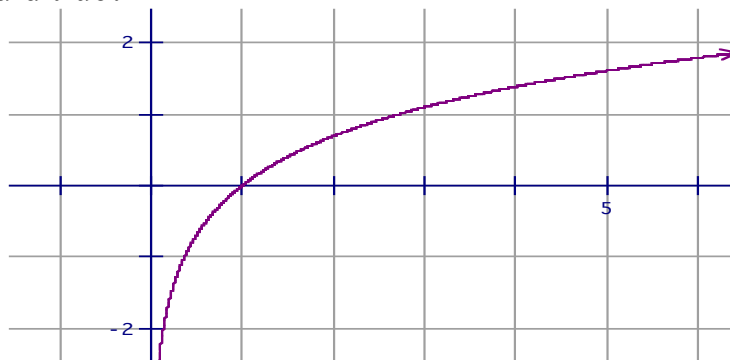


1. The graph of the function  $f(x)$  is shown above. At which point on the graph of  $f(x)$  is  $f'(x) > 0$  and  $f''(x) < 0$ ?

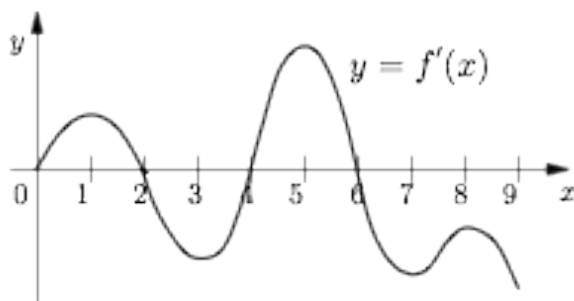
- a) A      b) B      c) C      d) D      e) E

2. The graph of a twice differentiable function  $f$  is shown below. Which of the following could be true?



- a)  $f''(1) < f(1) < f'(1)$                       b)  $f(1) < f''(1) < f'(1)$   
 c)  $f(1) < f'(1) < f''(1)$                       d)  $f'(1) < f''(1) < f(1)$   
 e)  $f'(1) < f(1) < f''(1)$

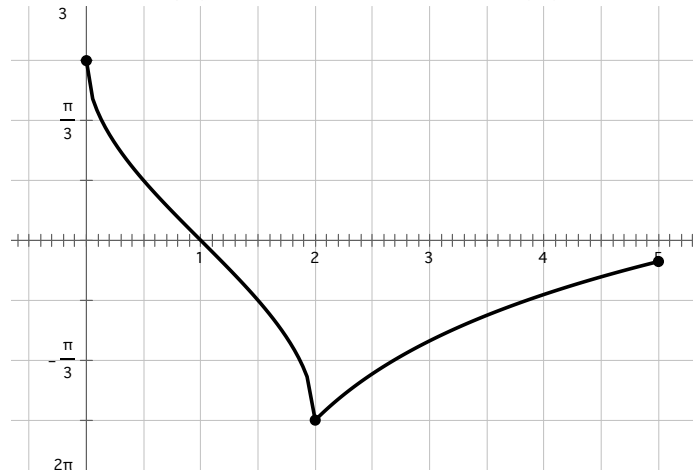
3. The graph of the derivative  $f'(x)$  on the interval  $[0, 9]$  is shown below.



If  $g'(x) = -3f'(x)$ , how many maxima will  $g(x)$  have on the interval  $[0, 9]$ ?

- a) None      b) One      c) Two      d) Three      e) Four

4. This is the graph of  $f'(x)$ , the derivative of  $f(x)$ .



Which of the following sign patterns are hidden with the graph.

I. 
$$F'(x) \begin{array}{c} + \quad 0 \quad - \\ \longleftarrow \quad \longrightarrow \\ x \quad 1 \end{array}$$

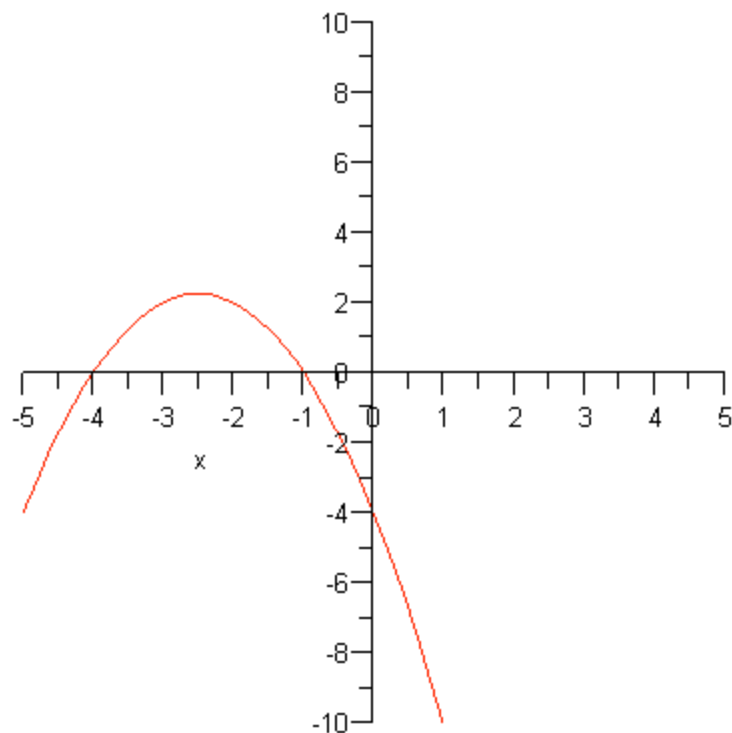
II. 
$$F''(x) \begin{array}{c} - \quad dne \quad + \\ \longleftarrow \quad \longrightarrow \\ x \quad 2 \end{array}$$

III. 
$$F''(x) \begin{array}{c} + \quad 0 \quad - \quad dne \quad - \\ \longleftarrow \quad \longrightarrow \\ x \quad 1 \quad 2 \end{array}$$

- a) I only                      b) II only                      c) I and II only  
 d) II and III only                      e) I, II, and III
-

5. A particle is moving along the  $x$ -axis in such a way that its velocity at time  $t > 0$  is given by  $v(t) = \frac{\ln t}{t}$ . At what value of  $t$  does  $v$  attain its maximum?

- a) 1    b)  $e^{1/2}$     c)  $e$     d)  $e^{3/2}$   
e) There is no maximum value of  $v$ .
- 



6. Above is shown the graph of  $f'(x)$ . Give a value of  $x$  where  $f$  has a local maximum.

- a) -4    b) -1    c)  $-\frac{5}{2}$     d) 1    e) no value of  $x$
-

7. This problem involves finding the absolute maximum and absolute minimum of the function  $f(x) = x^3 - 3x + 4$  restricted to the closed interval  $x \in [0, 2]$ . Which of the following statements is correct?

- a)  $f(x)$  has both an absolute maximum and absolute minimum at the end points.
  - b)  $f(x)$  has both an absolute maximum and absolute minimum at interior points.
  - c)  $f(x)$  has both an absolute maximum at an end point and an absolute minimum at an interior point.
  - d)  $f(x)$  has both an absolute maximum at an interior point and an absolute minimum at an end point.
  - e) None of the above
-

Honors PreCalculus '17-18  
Advanced Curve Sketching  
**Round to 3 decimal places.**  
Show all work.

Name: \_\_\_\_\_

score \_\_\_\_\_

1. Given  $y = \frac{-x}{x^2 - 4}$ , find the sign pattern for  $\frac{dy}{dx}$  and determine if the critical values are at a maximum, minimum, or neither.

2. Given  $y = \frac{-x}{x^2 - 4}$ , find the sign pattern for  $\frac{d^2y}{dx^2}$  and name the points of Inflection.

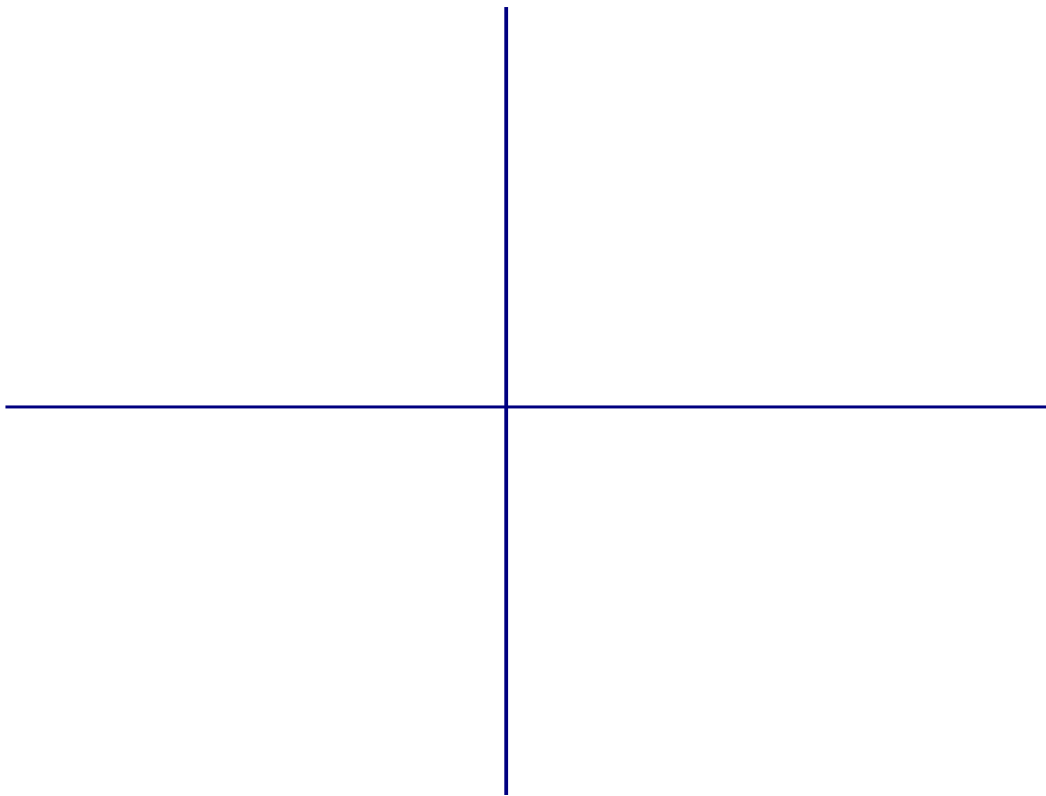
3. Given  $y = \left(\frac{1}{5}e^{-x}\right)\sqrt{9-x^2}$ , find the sign pattern for  $\frac{dy}{dx}$  and determine if the critical values are at a maximum, minimum, or neither.

4. Given  $y = \left(\frac{1}{5}e^{-x}\right)\sqrt{9-x^2}$ , find the sign pattern for  $\frac{d^2y}{dx^2}$  and name the points of Inflection.

Show all work.

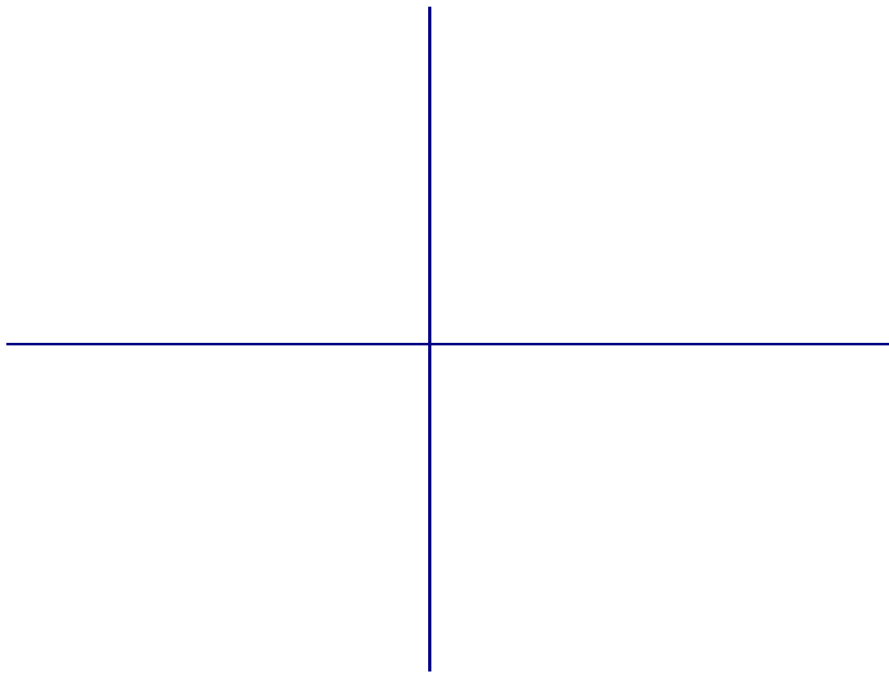
5. Sketch the graph of a continuous function with the following information:

	$x < -3$	$x = -3$	$-3 < x < 1$	$x = 1$	$1 < x < 5$	$x = 5$	$5 < x$
$f'(x)$	Positive	DNE	Positive	DNE	Positive	0	Positive
$f''(x)$	Positive	DNE	Positive	DNE	Negative	0	Positive





6. Set up a Key Trait table and sketch  $y = \frac{-x}{x^2 - 4}$



7. Set up a Key Trait table and sketch  $y = \left(\frac{1}{5}e^{-x}\right)\sqrt{9-x^2}$

