

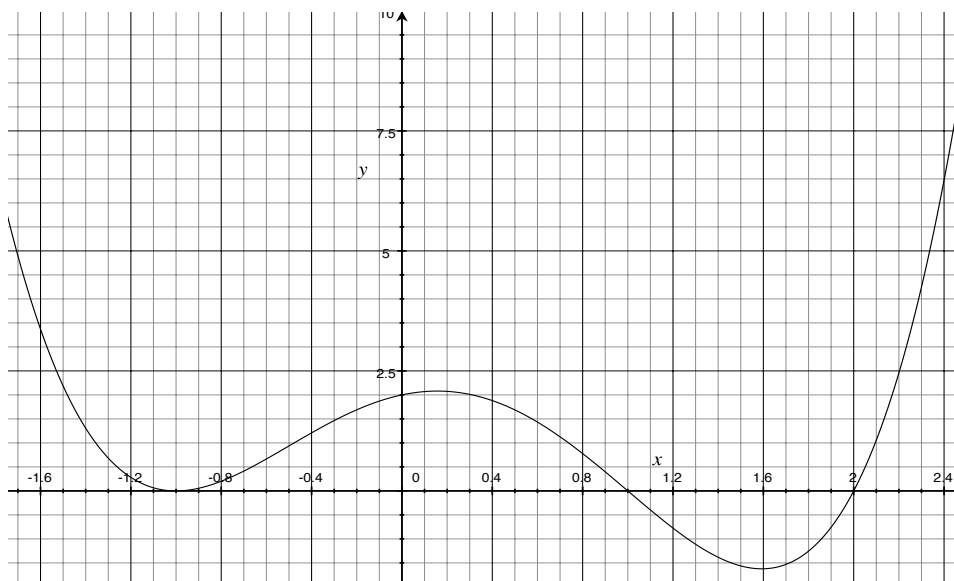
Name: \_\_\_\_\_

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1. **Do not open this booklet until you are told to do so.**
  2. Try not to separate the pages. If they do become separated, write your names on every page and point this out to your proctor when you hand it in.
  3. Show an appropriate amount of work (including appropriate explanation) for each problem and not just the final answer. Include units in your answer where that is appropriate.
  4. You may use any calculator functionally equivalent to a TI-83/TI-83+ or TI-84/TI-84+. Use of calculators with more functionality than these is not allowed.
  5. **Turn off all cell phones and pagers, and remove all headphones.**
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**Proficiency Level on Chapter 1:**\_\_\_\_\_

**Problem 1** Let the figure below refer to the graph of a function  $f(x)$ . In the problems which follow please explain your answers.

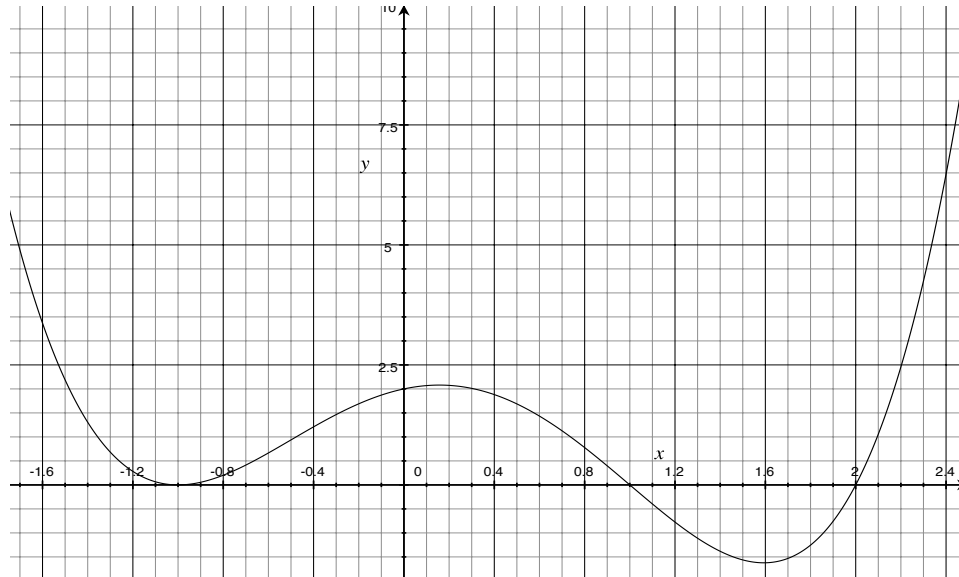


(a) Rank  $f'(-1.6)$ ,  $f'(-0.4)$ ,  $f'(0.4)$ ,  $f'(1.6)$  and  $f'(2.4)$  in **increasing** order.

(b) Find the stationary points of  $f$ .

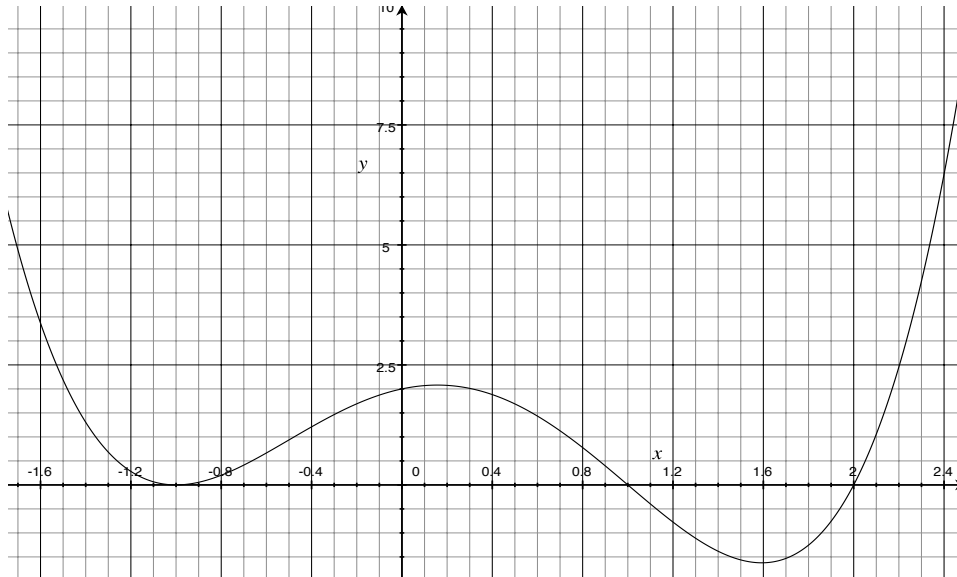
(c) Where does  $f'$  have a local maximum on the interval  $[-1.5, 0]$ . What can you say about the concavity of  $f$  at this point.

**Problem 2** Now let the figure below refer to the graph of the function  $f'(x)$ . In the problems which follow please explain your answers.



- (a) Find the stationary points of  $f(x)$ .
- (b) What are the local minimum and maximum points of  $f(x)$ ?
- (c) What is the concavity of  $f(x)$  on the interval  $(-\infty, 1.0) \cup (1.6, \infty)$ ?
- (d) Find the slope of the line tangent to  $f$  at  $x = 0$  if  $f(0) = 8$ .
- (e) What is the maximum possible value for  $f(b) - f(a)$  if  $a$  and  $b$  are in domain  $[-1, 1]$ ?

**Problem 3** Now let the figure below refer to the graph of the function  $f''(x)$ . In the problems which follow please explain your answers.



(a) Where is  $f(x)$  concave down?

(b) Where is  $f'(x)$  increasing?

(c) Find the inflection points of  $f(x)$ ?

**Problem 4** The figure shows the graph of  $f$ ,  $f'$ , and  $f''$ . Identify each curve, and explain your choices.

