Interpreting Derivatives 1

Consider the graph of f' on the interval [-3,3].

1. On what intervals is f increasing? Decreasing?

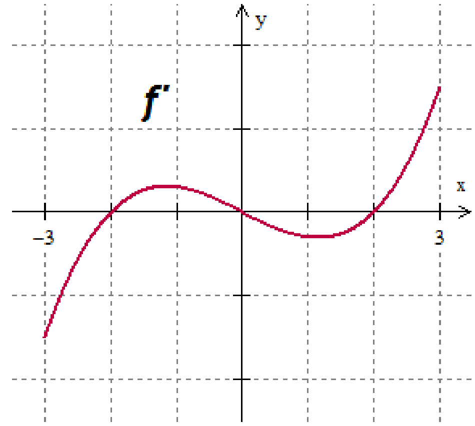
2. Where is f concave up and concave down?

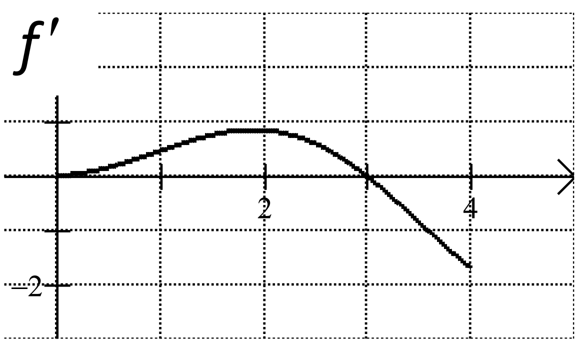
3. Where does f have a local maximum? A local minimum? Justify your answer.

4. Where does f have a point of inflection? Justify your answer.

5. Where does f have its minimum value on the interval [0,3]? Its maximum value?

6. Assume $f(0)=0$. Sketch a graph of f.



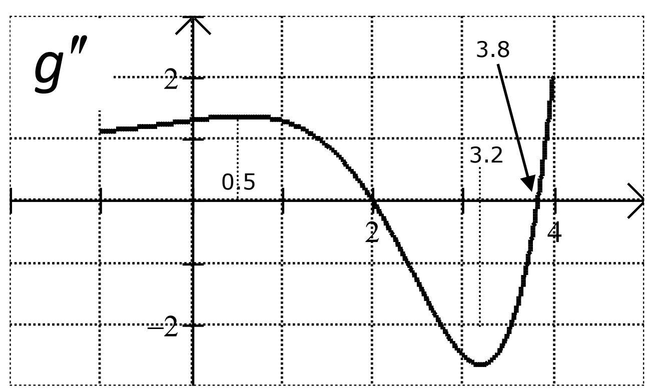


Consider the graph of f' on the interval [0,4].

7. Over what intervals is f increasing? Justify your answer.
8. Over what intervals is f concave down? Justify your answer.
9. Where is there a point of inflection on f?
10. If f(0)=2, graph f.

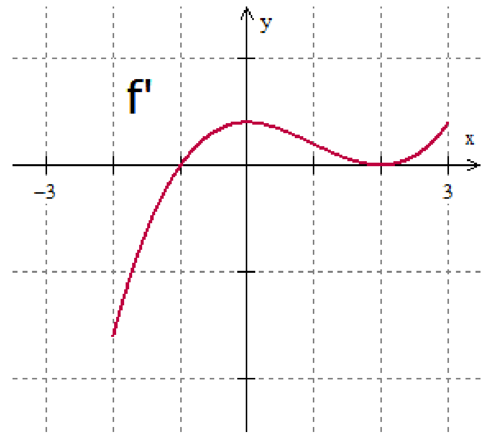
Consider the graph of g'' on the interval [-1,4].

11. Over what intervals is g concave down? Justify your answer.
12. Over what intervals is g' concave down? Justify your answer.
13. Where is there a point of inflection on g?
14. Where is there a point of inflection on g'?



Interpreting the derivative 2

Use the graph of f' on the interval [-3,3] to answer the questions about f.



1. On what intervals is f increasing? Decreasing?

2. Where does f have a stationary point?

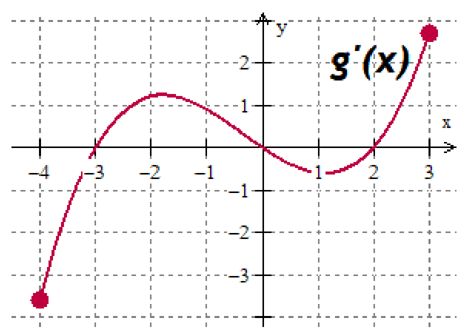
3. Where does f have a local maximum? A local minimum? Justify your answer.

4. Where does f have a point of inflection? Justify your answer.

5. Where does f have its minimum value on the interval [0,3]? Its maximum value?

6. Assume $f(0)=0$. Sketch a graph of f.

Use the graph of g' at the right on the interval [-4,3].

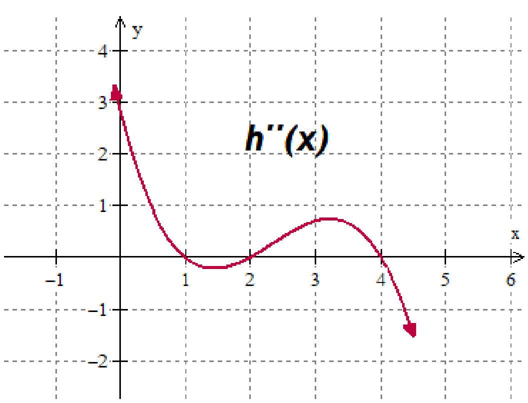


7. Is $g(2)<g(3)$? Explain.

8. Over what intervals is g concave down? Concave up? Justify your answer.

9. Where does g have a local maximum? A local minimum? Justify your answer.

10. Rank $g(-4),\ g(-2),\ g(-1),\ g(0)$ in increasing order.
(Think water levels!)



The graph of the **second derivative** of h is shown. Use the graph to answer questions about h and h'.

11. Where is the graph of h concave up? Concave down?

12. Where is the graph of h' concave up? Concave down?

13. Where is the point(s) of inflection on h?

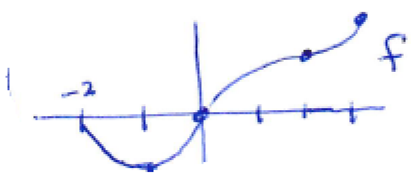
14. Where is the points(s) of inflection on h' ?

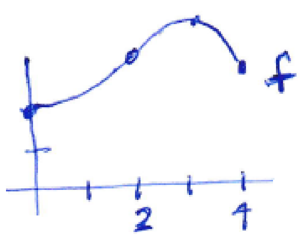
15. Rank $h'(1),\ h'(2),\ h'(3),\ h'(4)$ in increasing order. (Think water levels!)

Answers - Higher Derivatives

1. Inc: (-2,0) (2,3)   Dec: (-3,-2)(0,2)
2. Ccup: (-3,-1.2)(1.2,3) f’ has pos slope

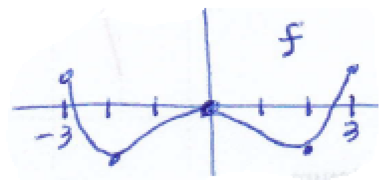
   ccdwn: (-1.2,1.2) f’ has neg slope
3. Local Max: 0; f’ switches from pos to neg at 0

   Local Min: -2,2; f’ switches from neg to pos at -2 and 2
4. POI: -1.2 and 1.2 ; f ‘ switches from increasing to decreasing at -1.2 and f ‘ switches from decreasing to increasing at 1.2
5. Max at 3, Min at 2.
6. 

7. (0,3), f’ is positive
8. (2,4), f’ is decreasing
9. At x = 2
10. 

11. (2, 3.8), g’’ is negative.
12. (.5, 3.2), g’’ is decreasing
13. x = 2, 3.8
14. x = 0.5, 3.2

Interpreting the Derivative

1. INC: $(-1,3)$ DEC: $(-2,-1)$
2. x = -1, 2
3. No Local Max, x = -1 is the local minimum
4. POI: x = 0, 2 ; f’ switches from increasing and decreasing at x=0. f’ switches from decreasing to increasing at x=2.
5. Min at x = 0, Max at x = 3
6. 

7. Yes, since g has positive slope between 2 and 5.
8. CCup: $(-4,-2)(1,3)$; g’ is increasing

   CCdown: (-2,1) ; g’ is decreasing
9. REL MAX at x = 0 ; f’ switches from positive to negative

   REL MIN at x = -3, 2 ; f’ switches from negative to positive
10. g(-2), g(-4), g(-1), g(0)
11. CCup: $(-\infty,1)(2,4)$

    CCdown: (1, 2) $(4,\infty)$; g’ is decreasing
12. CCup: $(1.5,3.3)$

    CCdown: $(-\infty,1.5)(3.3,\infty)$
13. x = 1, 2, 4
14. x = 1.5, 3.3
15. $h'(2), h'(1), h'(3), h'(4)$