

## MATH 141 WORKSHEET 7

Show all work for full credit.

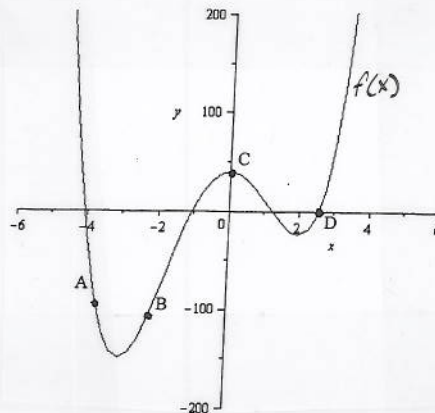
1. The graph of  $y = f(x)$  is given. Are the following quantities positive, negative, or zero?

a.  $f(A)$  \_\_\_\_\_ b.  $f'(A)$  \_\_\_\_\_ c.  $f''(A)$  \_\_\_\_\_

d.  $f(B)$  \_\_\_\_\_ e.  $f'(B)$  \_\_\_\_\_ f.  $f''(B)$  \_\_\_\_\_

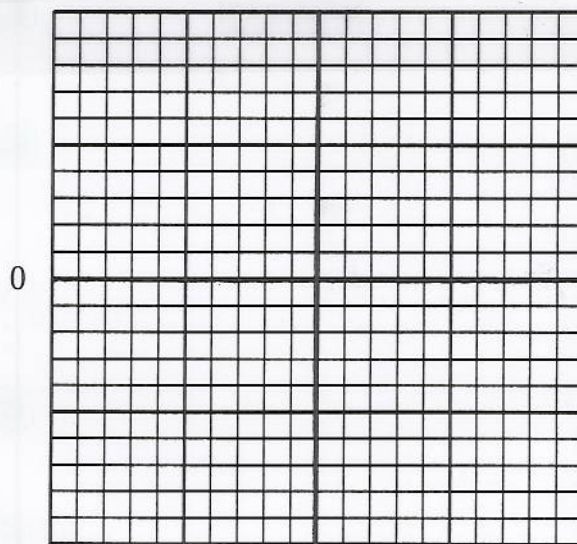
g.  $f(C)$  \_\_\_\_\_ h.  $f'(C)$  \_\_\_\_\_ i.  $f''(C)$  \_\_\_\_\_

j.  $f(D)$  \_\_\_\_\_ k.  $f'(D)$  \_\_\_\_\_ l.  $f''(D)$  \_\_\_\_\_



2. Sketch the graph of a function  $F$  that has the following properties:

- $F$  is everywhere continuous
- $F(-2) = 2$
- $F(0) = 0$
- $F(3) = -4$
- $F'(-2) = 0$
- $F'(3) = 0$
- $F'(x) > 0$  for  $x < -2$
- $F'(x) < 0$  for  $-2 < x < 3$
- $F'(x) > 0$  for  $x > 3$
- $F''(x) < 0$  for  $x < 0$
- $F''(x) > 0$  for  $0 < x < 6$
- $F''(x) < 0$  for  $x > 6$



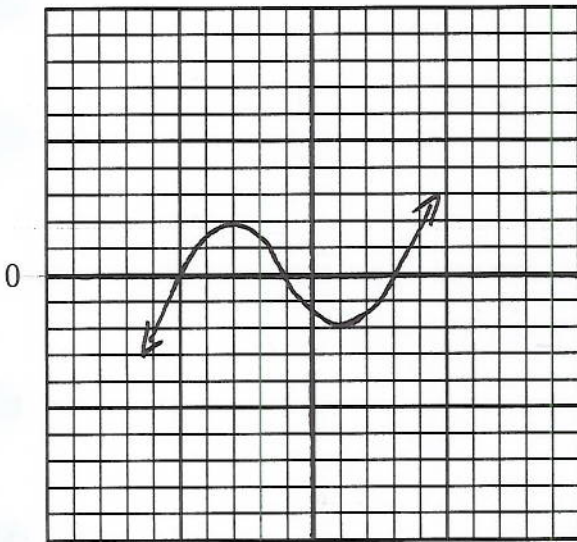
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3. Find the intervals over which  $f(x)$  is increasing, decreasing, concave up, and concave down. Give your answers in interval notation.

$$f(x) = x^3 - 15x^2 + 72x - 20$$

4. Given the following graph of  $f'(x)$ , determine the intervals over which  $f(x)$  is increasing, decreasing, concave up, and concave down.



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5. Determine the absolute maximum and absolute minimum of  $f(x)$  over the given interval.

$$f(x) = x^3 - 3x^2 - 24x + 20 \quad \text{over } [-5, 5]$$

6. Determine the absolute maximum and absolute minimum of  $f(x)$  over the given interval.

$$f(x) = 3x^4 - 4x^3 - 12x^2 + 5 \quad \text{over } [-2, 3]$$

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7. Find the absolute extrema of  $f(x)$  over the entire real number line.

$$f(x) = 8x^2 - x^4 + 24$$