WORKSHEET: Functions, their derivatives, and rates of change **MATH 1300**

ANSWERS IN RED

GOAL: To better understand the relationship between the graph of a function and the graph of its derivative.

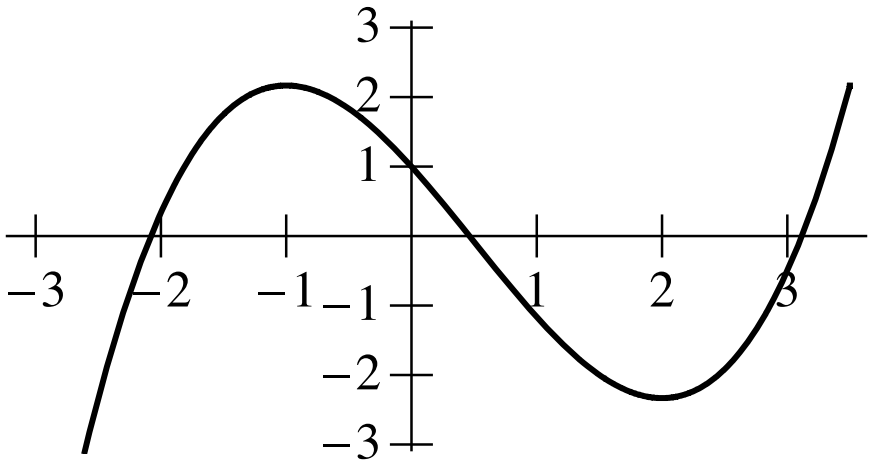
1. The graph of a function f is given below. Estimate the values of $f'(x)$ at each of the following x-values:

a. $x = -2$ $f'(-2) \approx 4$

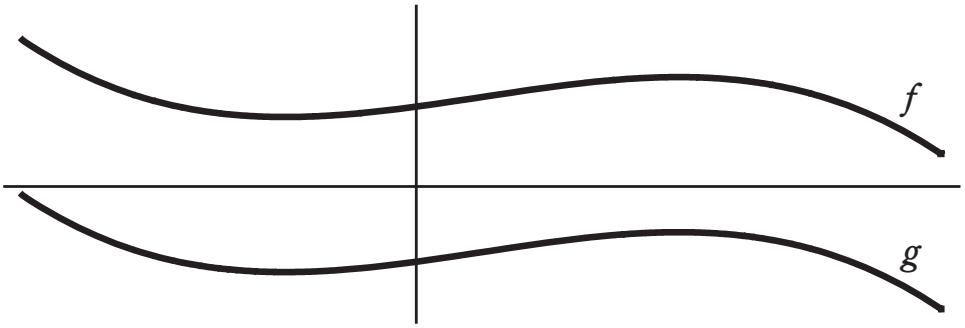
b. $x = -1$ $f'(-1) \approx 0$

c. $x = 0$ $f'(0) \approx -2$

d. $x = 3$ $f'(3) \approx 4$

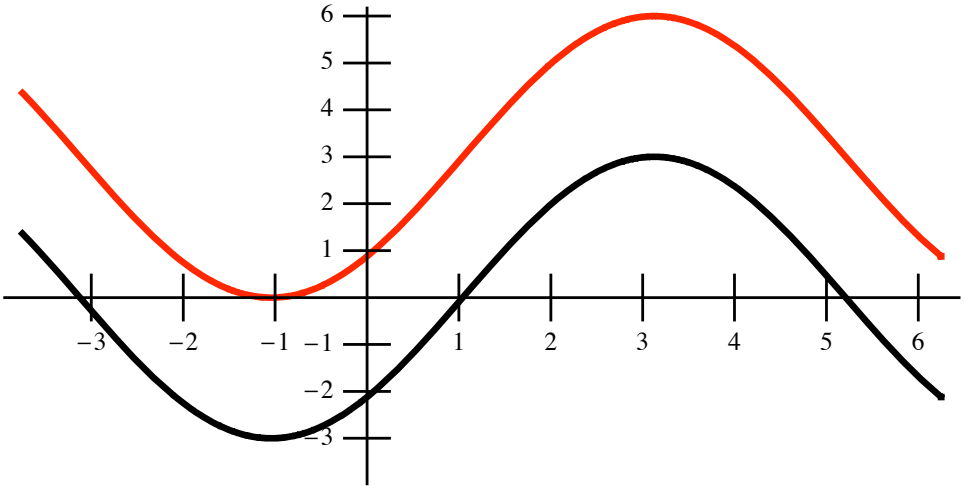


2. The graphs of two functions f and g are given below. What is the derivative of $h(x) = f(x) - g(x)$?

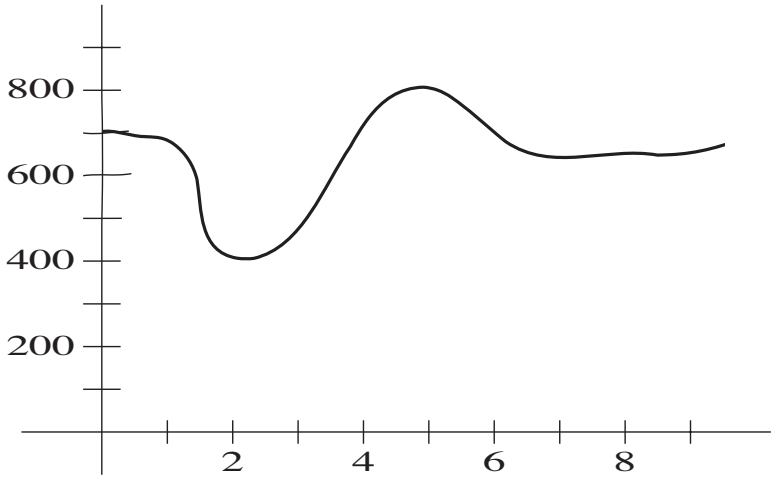


$h(x) = f(x) - g(x)$ is constant. The derivative of a constant function is zero, so $h'(x) = 0$.

3. The graph of f is given below. On the same coordinate axes sketch the graph of a function g which satisfies both of the following conditions: **a.** $g'(x) = f'(x)$ for all real numbers x, and **b.** $g(-1) = 0$.



4. The number of deer in a forest t years after the beginning of a population study is shown by the graph below.



Over which of the following time intervals did the population of the deer decline at an average rate of 100 deer per year?

a. [0,1] **b.** [1,2] **c.** [1,3] **d.** [1,4] **e.** [5,6]

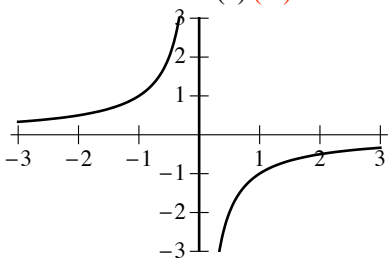
Over the interval $[5, 6]$, the average rate of change of the population of deer was approximately

$$\frac{700 - 800}{6 - 5} = -100$$

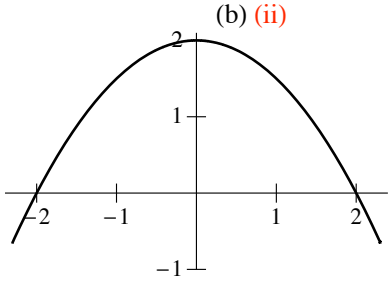
deer per year.

5. Match the five functions a–e, given below, with their derivatives i–v. (You must be able to explain your reasoning).

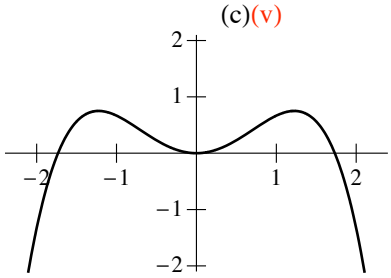
(a) (iv)



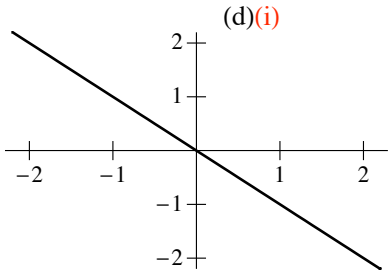
(b) (ii)



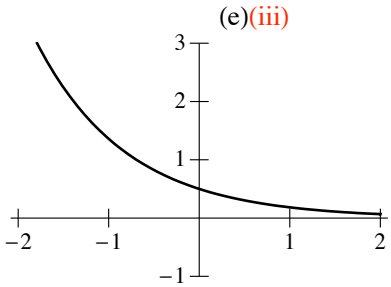
(c)(v)



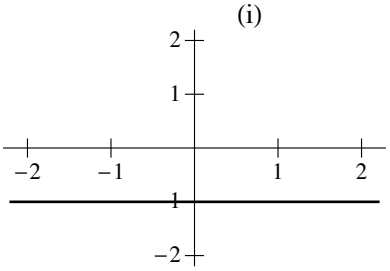
(d)(i)



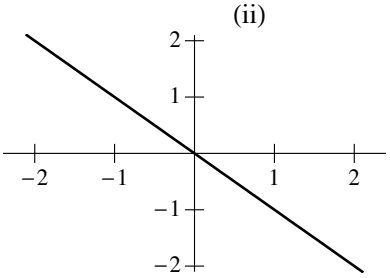
(e)(iii)



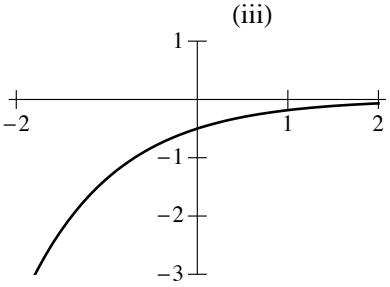
(i)



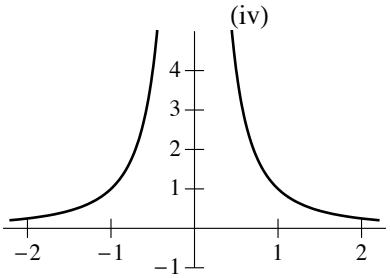
(ii)



(iii)



(iv)



(v)