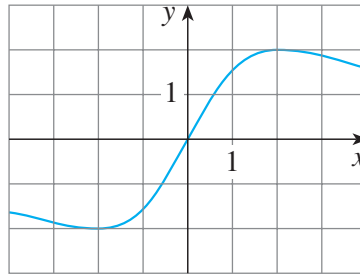


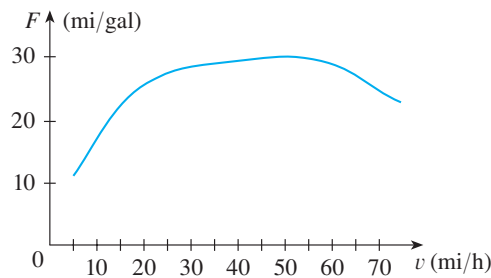
Due by 9am on October 20. Please upload your solutions to Canvas as one PDF file. Do not forget to attach the honor code. Each problem is worth 10 points. You must show all your work for full credit.

(1) Use the given graph to estimate the value of each derivative. Then sketch the graph of f' .

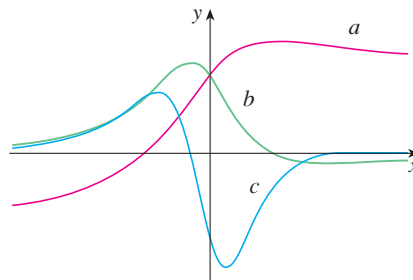
- (i) $f'(-3)$ (iii) $f'(-1)$ (v) $f'(1)$ (vii) $f'(3)$
- (ii) $f'(-2)$ (iv) $f'(0)$ (vi) $f'(2)$



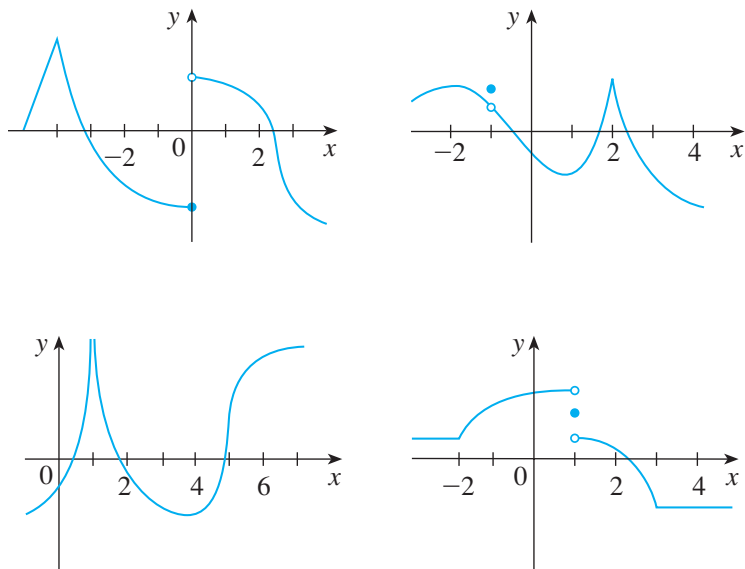
- (2) Let $g(x) = \sqrt{9-x}$. Find the derivative of the function using the definition of derivative. State the domain of the function and the domain of its derivative. Sketch the graphs of the function and its derivative function.
- (3) Let $f(x) = \frac{x^2 - 1}{2x - 3}$. Find the derivative of the function using the definition of derivative. State the domain of the function and the domain of its derivative.
- (4) Let $f(x) = x^3 - x$. Find the first derivative f' and second derivative f'' of the following function using the definition of derivative. State the domain of f , f' and f'' . Sketch the graphs of f , f' and f'' in the same xy -plane.
- (5) Find the points on the graph of $y = x^2 + 3x - 7$ at which the slope of the tangent line is equal to 4.
- (6) Find the values of x where $y = x^3$ and $y = x^2 + 5x$ have parallel tangent lines.
- (7) The graph (from the US Department of Energy) shows how driving speed affects gas mileage. Fuel economy F is measured in miles per gallon and speed v is measured in miles per hour. What is the meaning of the derivative $F'(v)$. Sketch the graph of $F'(v)$. At what speed should you drive if you want to save on gas?



(8) The figure shows the graphs of f , f' , and f'' . Identify each curve, and explain your choices.



(9) The graph of f is given. State, with reasons, the numbers at which f is not differentiable.



(10) Match the graph of each function in (a) – (d) with the graph of its derivative in I – IV. Give reasons for your choices.

