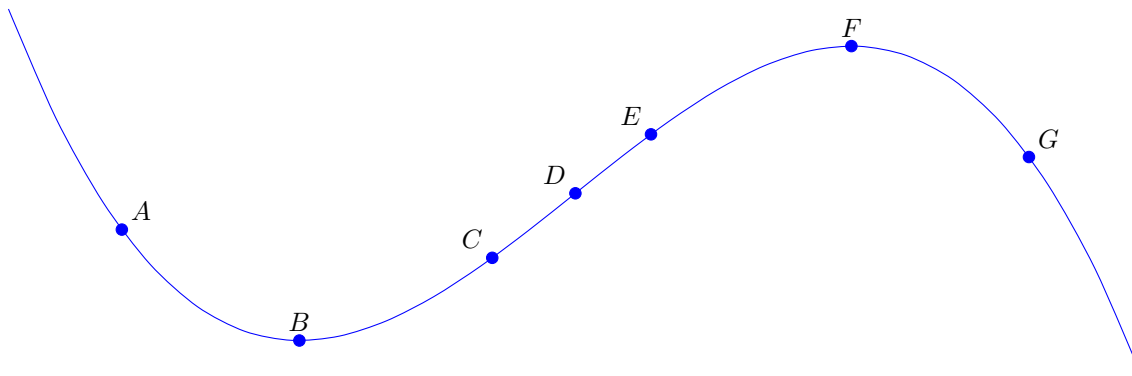


Name: _____

This assignment consists of seven questions, each worth five points for a total of 35 points. To receive full credit you must **show all necessary work**. You should write your answers in the spaces provided, but if you require more space please *staple any extra sheets* you use to this assignment. If you are having trouble with any of the problems, look at the lecture notes and exercises in the lecture notes for help. Remember to start this assignment early, your next quiz is based on this assignment.



1. Consider the graph of the function $f(x)$ above. Determine if the following quantities are positive, negative or zero.

(a) The derivative at A

Answer: _____

(b) The second derivative at A

Answer: _____

(c) The second derivative at D

Answer: _____

2. Consider the graph of the function $f(x)$ above. Find the point that matches the following descriptions.

(a) $f'(x) > 0$, $f''(x) < 0$

Answer: _____

(b) $f'(x) > 0$, $f''(x) > 0$

Answer: _____

(c) $f'(x) < 0$, $f''(x) < 0$

Answer: _____

3. Let $C(q)$ represent the total cost, in dollars, of producing q items. Suppose $C(15) = 2,300$ and $C'(15) = 108$. Estimate the total cost of producing

(a) 16 items

Answer: _____

(b) 14 items

Answer: _____

4. To produce 1,000 items, the total cost is \$5,000 and the marginal cost is \$25 per item. Estimate the costs of producing

(a) 1,001 items

Answer: _____

(b) 999 items

Answer: _____

(c) 1,100 items

Answer: _____

(d) 900 items

Answer: _____

5. An industrial production process costs $C(q)$ million dollars to produce q million units; these units then sell for $R(q)$ million dollars. If $C(2.1) = 5.1$, $R(2.1) = 6.9$, $MC(2.1) = 0.6$ and $MR(2.1) = 0.7$, calculate

(a) The profit earned by producing 2.1 million units

Answer: _____

(b) The approximate change in revenue if the production increases from 2.1 to 2.4 million units

Answer: _____

(c) The approximate change in revenue if the production decreases from 2.1 to 2.05 million units

Answer: _____

(d) The approximate change in profit if the production increases from 2.1 to 2.4 million units

Answer: _____

(e) The approximate change in profit if the production decreases from 2.1 to 2.05 million units

Answer: _____

6. Differentiate

(a) $A(t) = 3t^5$

Answer: _____

(b) $r(p) = p^5 + p^3$

Answer: _____

(c) $f(x) = 5x^2 - 7x^3$

Answer: _____

(d) $g(t) = \frac{t^2}{4} + 3$

Answer: _____

7. The revenue, in dollars, from producing q units of a product is given by

$$R(q) = 1000q - 3q^2.$$

(a) Find $R(125)$

Answer: _____

(b) Find $R'(125)$

Answer: _____

(c) Determine if $R(q)$ is concave up or down at $q = 125$

Answer: _____