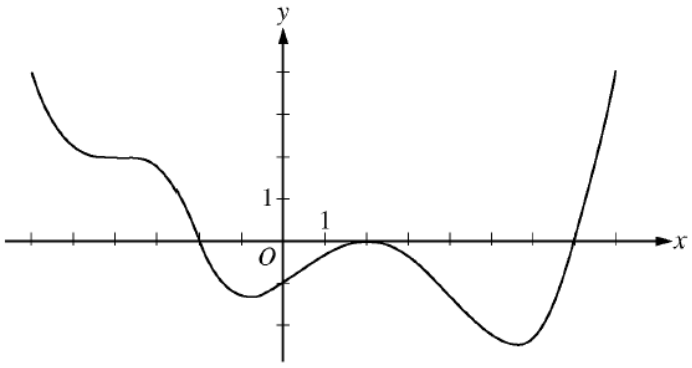
**Show all work that leads to your answers!**

| $x$ | $f(x)$ |
|---|---|
| 1 | 2.4 |
| 3 | 3.6 |
| 5 | 5.4 |

80. The table above gives selected values of a function $f$. The function is twice differentiable with $f''(x) > 0$. Which of the following could be the value of $f'(3)$ ?

(A) 0.6 (B) 0.7 (C) 0.9 (D) 1.2 (E) 1.5




Graph of $f'$

82. The figure above shows the graph of $f'$, the derivative of function $f$, for $-6 < x < 8$. Of the following, which best describes the graph of $f$ on the same interval?

(A) 1 relative minimum, 1 relative maximum, and 3 points of inflection

(B) 1 relative minimum, 1 relative maximum, and 4 points of inflection

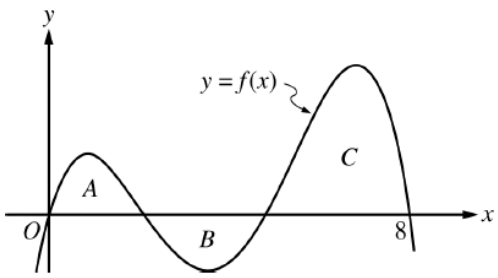
(C) 2 relative minima, 1 relative maximum, and 2 points of inflection

(D) 2 relative minima, 1 relative maximum, and 4 points of inflection

(E) 2 relative minima, 2 relative maxima, and 3 points of inflection

83. Let $f$ and $g$ be continuous functions such that $\int_0^6 f(x)\,dx = 9$, $\int_3^6 f(x)\,dx = 5$, and $\int_3^0 g(x)\,dx = -7$. What is the value of $\int_0^3 \left(\frac{1}{2}f(x) - 3g(x)\right)dx$ ?

(A) $-23$ (B) $-19$ (C) $-\frac{17}{2}$ (D) 19 (E) 23




84. The regions $A$, $B$, and $C$ in the figure above are bounded by the graph of the function $f$ and the $x$-axis. The area of region $A$ is 14, the area of region $B$ is 16, and the area of region $C$ is 50. What is the average value of $f$ on the interval $[0, 8]$?

(A) 6 (B) 10 (C) $\frac{40}{3}$ (D) $\frac{80}{3}$ (E) 48

87. A differentiable function $f$ has the property that $f'(x) \le 3$ for $1 \le x \le 8$ and $f(5) = 6$. Which of the following could be true?

I. $f(2) = 0$

II. $f(6) = -2$

III. $f(7) = 13$

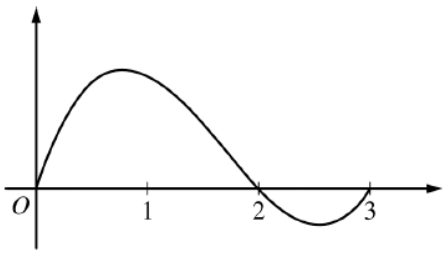
(A) I only

(B) II only

(C) I and II only

(D) I and III only

(E) II and III only




Graph of $f$

88. The graph of the differentiable function $f$ is shown in the figure above. Let $h$ be the function defined by $h(x) = \int_0^x f(t)\,dt$. Which of the following correctly orders $h(2)$, $h'(2)$, and $h''(2)$?

(A) $h(2) < h'(2) < h''(2)$

(B) $h'(2) < h(2) < h''(2)$

(C) $h'(2) < h''(2) < h(2)$

(D) $h''(2) < h(2) < h'(2)$

(E) $h''(2) < h'(2) < h(2)$

91. Let $F$ be a function defined for all real numbers $x$ such that $F'(x) > 0$ and $F''(x) > 0$. Which of the following could be a table of values for $F$ ?

(A)

| $x$ | $F(x)$ |
|---|---|
| 1 | –3 |
| 2 | –4 |
| 3 | –6 |
| 4 | –9 |

(B)

| $x$ | $F(x)$ |
|---|---|
| 1 | –3 |
| 2 | –1 |
| 3 | 3 |
| 4 | 19 |

(C)

| $x$ | $F(x)$ |
|---|---|
| 1 | –3 |
| 2 | 0 |
| 3 | 3 |
| 4 | 6 |

(D)

| $x$ | $F(x)$ |
|---|---|
| 1 | –3 |
| 2 | 5 |
| 3 | 11 |
| 4 | 13 |

| $x$ | $f(x)$ | $g(x)$ | $f'(x)$ |
|---|---|---|---|
| –4 | 0 | –9 | 5 |
| –2 | 4 | –7 | 4 |
| 0 | 6 | –4 | 2 |
| 2 | 7 | –3 | 1 |
| 4 | 10 | –2 | 3 |

92. The table above gives values of the differentiable functions $f$ and $g$, and $f'$, the derivative of $f$, at selected values of $x$. If $g(x) = f^{-1}(x)$, what is the value of $g'(4)$ ?

(A) $-\frac{1}{3}$ (B $-\frac{1}{4}$ (C) $-\frac{3}{100}$ (D $\frac{1}{4}$ (E) $\frac{1}{3}$