
Assuming that $\int_0^5 f(x)\,dx = 5$ and $\int_0^5 g(x) = 12$, find

$$\int_0^5 \left(3f(x) - \frac{1}{3}g(x)\right) dx.$$

- A. 11
- B. 4
- C. 15
- D. 19
- E. 17
- F. None of the above

If f and g are continuous functions with $f(9) = 6$ and $\lim_{x\to 9}[2f(x) - g(x)] = 9$, find $g(9)$.

- A. 24
- B. 3
- C. 21
- D. 15
- E. 12
- F. None of the above

Find the equation to the tangent line to $y = \frac{\sqrt{x}}{x+6}$ at $\left(4, \frac{2}{10}\right)$.

- A. $y = 0.2 + (x-4)$
- B. $y = \frac{1}{5} + \frac{1}{200}(x-4)$
- C. $y = \frac{1}{200} + \frac{2}{10}(x-4)$
- D. $y = 0.2 + \frac{1}{20}(x-4)$
- E. $y = 0.2 + \frac{6-x}{2\sqrt{x}(x+6)^2}(x-4)$
- F. None of the above

The function $f(x)$ is given below.

$$f(x) = \begin{cases} \dfrac{x^2-4}{x-2} & \text{if } 0 \le x < 2 \\ ax^2 - bx + 2 & \text{if } 2 \le x < 3 \\ 2x - 3a - b & \text{if } 3 \le x \le 5 \end{cases}$$

where a and b are constants. Find the values of a and b for which $f(x)$ is continuous on $[0,5]$.

- A. $a = 0$, $b = -2$
- B. $a = 0$, $b = -1$
- C. $a = \dfrac{1}{2}$, $b = 0$
- D. $a = \dfrac{1}{4}$, $b = -\dfrac{1}{2}$
- E. $a = -\dfrac{1}{4}$, $b = \dfrac{1}{2}$
- F. None of the above

If the tangent line to $y = f(x)$ at $(8,4)$ passes through the point $(4,-32)$, find $f'(8)$.

- A. $f'(8) = -9$
- B. $f'(8) = 19$
- C. $f'(8) = 9$
- D. $f'(8) = 29$
- E. $f'(8) = 34$
- F. None of the above

If $h(x) = g\left[(f(x))^2\right]$, $g'(-6) = 5$, $g'(4) = -2$, $f(2) = 2$ and $f'(2) = -3$, find $h'(2)$.

- A. 12
- B. -8
- C. -12
- D. 5
- E. 24
- F. None of the above

If $f(2) = 7$ and $f'(2) = -5$, find $\dfrac{d}{dx}\left.\dfrac{f(x)}{x^2+1}\right|_{x=2}$.

- A. $\dfrac{1}{25}$
- B. $-\dfrac{53}{25}$
- C. $\dfrac{3}{25}$
- D. -29
- E. $-\dfrac{33}{5}$
- F. None of the above

Find f' in terms of g' if

$$f(x) = x^5 g(x).$$

- A. $f'(x) = 5x^4 g(x) + x^5 g'(x)$
- B. $f'(x) = x^5 g(x) + 5x^4 g'(x)$
- C. $f'(x) = 5x^4 g'(x)$
- D. $f'(x) = x^5 g'(x) - 5x^4 g(x)$

- E. $f'(x) = 5x^4 + g'(x)$
- F. None of the above

The linearization for $f(x) = \dfrac{x}{1+x^2}$ at $x = 2$ is

- A. $L(x) = \dfrac{3}{25}x - \dfrac{1}{25}$
- B. $L(x) = \dfrac{2}{5}x$
- C. $L(x) = \dfrac{2}{5}$
- D. $L(x) = -\dfrac{3}{25}x + \dfrac{16}{25}$
- E. $L(x) = x + 2$
- F. None of the above

Find the equation of the tangent line to the curve $x^2 - xy - y^2 = 1$ at the point $(2, 1)$.

- A. $y = \dfrac{3}{4}x + \dfrac{5}{2}$
- B. $y = -\dfrac{3}{4}x + \dfrac{5}{2}$
- C. $y = \dfrac{3}{4}x - \dfrac{1}{2}$
- D. $y = 1$
- E. $y = -\dfrac{3}{4}x + \dfrac{1}{2}$
- F. None of the above

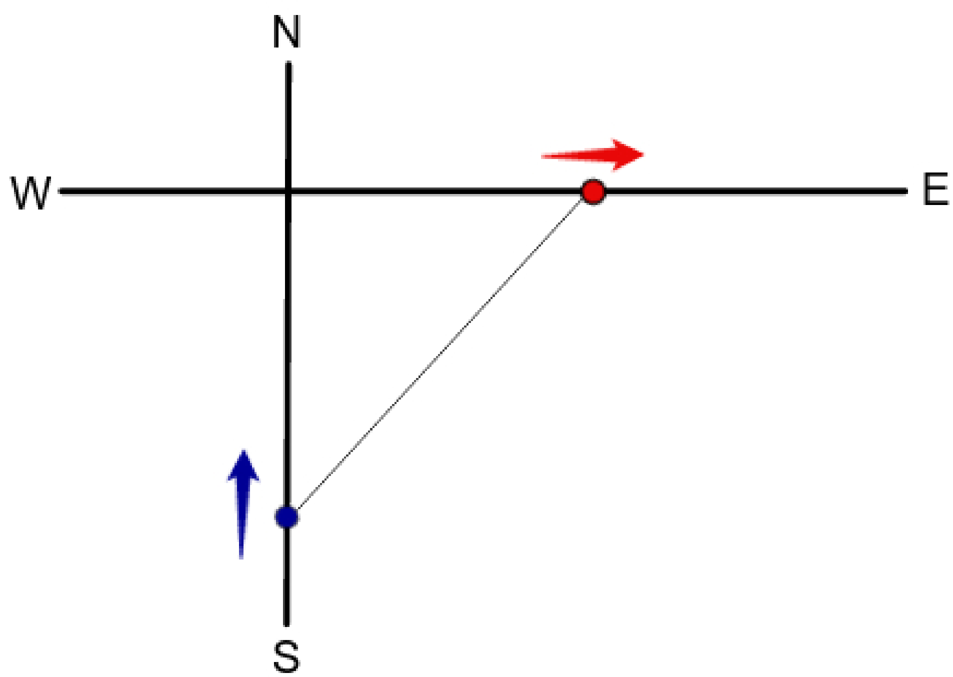
Find the absolute maximum value of the function $f(x) = x\sqrt{4x - x^2}$ on the interval $[0, 4]$.

- A. $3\sqrt{7}$
- B. $\dfrac{52}{10}$
- C. $4\sqrt{2}$
- D. $3\sqrt{3}$
- E. 3
- F. None of the above

The function $f(x) = 7x^2 - x + 5$ satisfies the hypotheses of the Mean Value Theorem on the interval $[-1, 7]$. Find all values of c that satisfy the conclusion of the theorem.

- A. $2,\ 4$
- B. 4
- C. 3
- D. $3,\ 4$
- E. $2,\ 3$
- F. None of the above

13. **(5 points)** `Library/Valdosta/APEX_Calculus/4.2/APEX_4.2_6.pg`



Suppose a police officer is 1/2 mile south of an intersection, driving north towards the intersection at 40 mph. At the same time, another car is 1/2 mile east of the intersection, driving east (away from the intersection) at an unknown speed. The officer's radar gun indicates 20 mph when pointed at the other car (that is, the straight-line distance between the officer and the other car is increasing at a rate of 20 mph). What is the speed of the other car?

Speed = ______ mph.

Now suppose that the officer's radar gun indicates -20 mph instead (that is, the straight-line distance is decreasing at a rate of 20 mph). What is the speed of the other car this time?

Speed = ______ mph.

---

14. **(5 points)** `Library/Valdosta/APEX_Calculus/6.7/APEX_6.7_9.pg`

Evaluate the limit, using L'Hôpital's Rule.

Enter **INF** for ∞, **-INF** for $-\infty$, or **DNE** if the limit does not exist, but is neither ∞ nor $-\infty$.

$$\lim_{t \to -4} \frac{t^2 - 16}{3t^2 + 7t - 20} = \_\_\_\_$$

---

15. **(5 points)** `Library/UCSB/Stewart5_4_4/Stewart5_4_4_31.pg`

Find the limit. Use l'Hospital's Rule if appropriate. Use INF to represent positive infinity, NINF for negative infinity, and D for the limit does not exist.

$$\lim_{x \to \infty} \frac{7x}{3\ln(1 + 2e^x)} = \_\_\_\_\_\_$$

---

16. **(5 points)** `Library/Valdosta/APEX_Calculus/4.3/APEX_4.3_7.pg`

Find the maximal area of a right triangle with hypotenuse of length 8.

____

17. **(5 points)** `Library/UMN/calculusStewartCCC/s_4_8_31.pg`

Find f if $f''(x) = \sin x + \cos x$, $f'(0) = 8$, and $f(0) = 2$.

Answer: $f(x) =$ ____________________

18. **(5 points)** `Library/UMN/calculusStewartCCC/s_5_4_25.pg`

If $f(1) = 11$, f' is continuous, and $\int_1^8 f'(t)\,dt = 23$, what is the value of $f(8)$?

Answer: __________

19. **(5 points)** `Library/Wiley/setAnton_Section_5.6/Anton_5_6_Q63.pg`

Let $F(x) = \int_{10}^{x} \sqrt{t^2 + 21}\,dt$. Find

(a) $F(10) =$ __________

(b) $F'(10) =$ __________

(c) $F''(10) =$ __________

20. **(5 points)** `Library/UMN/calculusStewartCCC/s_5_5_67.pg`

If f is continuous and $\int_0^{10} f(x)\,dx = 50$, find $\int_0^5 f(2x)\,dx$.

Answer: __________