APCalcBC-HomeworkQuiz-#1

1. If f and g are twice differentiable functions such that $g(x) = e^{f(x)}$ and $g''(x) = h(x)e^{f(x)}$, then $h(x) =$

(A) $f'(x) + f''(x)$

(B) $f'(x) + (f''(x))^2$

(C) $(f'(x) + f''(x))^2$

(D) $(f'(x))^2 + f''(x)$

(E) $2f'(x) + f''(x)$

2. Let f be a function that is continuous on the closed interval $[2, 4]$ with $f(2) = 10$ and $f(4) = 20$. Which of the following is guaranteed by the Intermediate Value Theorem?

(A) $f(x) = 13$ has at least one solution in the open interval $(2, 4)$.

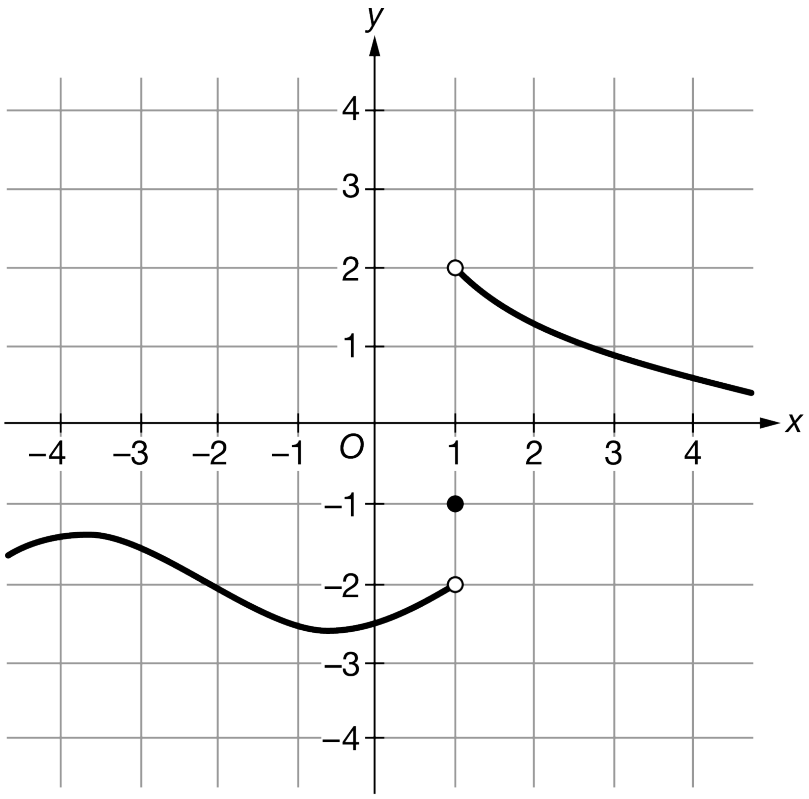
(B) $f(3) = 15$

(C) f attains a maximum on the open interval $(2, 4)$.

(D) $f'(x) = 5$ has at least one solution in the open interval $(2, 4)$.

(E) $f'(x) > 0$ for all x in the open interval $(2, 4)$.

3.



Graph of f

The graph of the function f is shown in the figure above. The value of $\lim_{x \to 1^+} f(x)$ is

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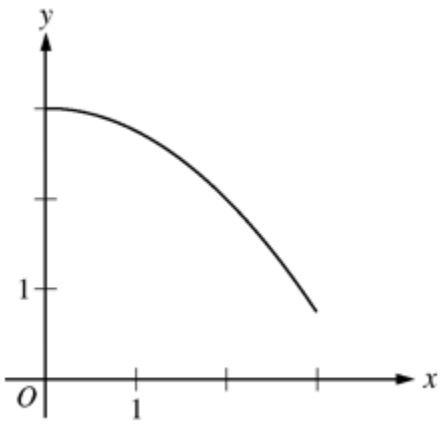
(A) -2
(B) -1
(C) 2
(D) nonexistent

4. A person 2 meters tall walks directly away from a streetlight that is 8 meters above the ground. If the person is walking at a constant rate and the person's shadow is lengthening at the rate of 4/9 meter per second, at what rate, in meters per second, is the person walking?

(A) 4/27
(B) 4/9
(C) 3/4
(D) 4/3
(E) 16/9

5.



Graph of f

The graph of the function f is shown above for $0 \le x \le 3$. Of the following, which has the least value?

(A) $\int_1^3 f(x)dx$
(B) Left Riemann sum approximation of $\int_1^3 f(x)dx$ with 4 subintervals of equal length
(C) Right Riemann sum approximation of $\int_1^3 f(x)dx$ with 4 subintervals of equal length
(D) Midpoint Riemann sum approximation of $\int_1^3 f(x)dx$ with 4 subintervals of equal length
(E) Trapezoidal sum approximation of $\int_1^3 f(x)dx$ with 4 subintervals of equal length

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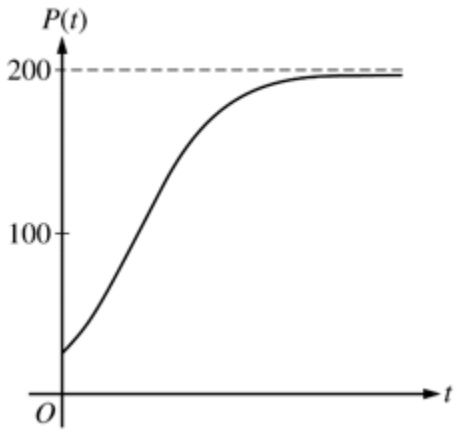
6.



Which of the following differential equations for a population P could model the logistic growth shown in the figure above?

(A) $\frac{dP}{dt} = 0.2P - 0.001P^2$

(B) $\frac{dP}{dt} = 0.1P - 0.001P^2$

(C) $\frac{dP}{dt} = 0.2P^2 - 0.001P$

(D) $\frac{dP}{dt} = 0.1P^2 - 0.001P$

(E) $\frac{dP}{dt} = 0.1P^2 + 0.001P$

7. $\lim_{x \to 0} \frac{e^x - \cos x - 2x}{x^2 - 2x}$ is

(A) $-\frac{1}{2}$

(B) 0

(C) $\frac{1}{2}$

(D) 1

(E) nonexistent

8. A curve is defined by the parametric equations $x(t) = t^2 + 3$ and $y(t) = \sin\left(t^2\right)$. Which of the following is an expression for $\frac{d^2y}{dx^2}$ in terms of t ?

(A) $-\sin\left(t^2\right)$

(B) $-2t\sin\left(t^2\right)$

(C) $\cos\left(t^2\right) - 2t^2\sin\left(t^2\right)$

(D) $2\cos\left(t^2\right) - 4t^2\sin\left(t^2\right)$

9. Let $f(x) = \int_{-2}^{x^2-3x} e^{t^2}\,dt$. At what value of x is $f(x)$ a minimum?

(A) For no value of x

(B) $\frac{1}{2}$

(C) $\frac{3}{2}$

(D) 2

(E) 3

10. The third-degree Taylor polynomial about $x = 0$ of $\ln(1 - x)$ is

(A) $-x - \frac{x^2}{2} - \frac{x^3}{3}$

(B) $1 - x + \frac{x^2}{2}$

(C) $x - \frac{x^2}{2} + \frac{x^3}{3}$

(D) $-1 + x - \frac{x^2}{2}$

(E) $-x + \frac{x^2}{2} - \frac{x^3}{3}$