Administrators at a hospital believe that the number of beds in use is given by the function $B(t) = 20\sin(t/10) + 50$, where t is measured in days.
For $12 \le t \le 20$, what is the minimum number of beds in use? (calc)

A.

30

The velocity of a particle is given by $v(t) = -2 + (t^2 + 3)^4$. At $t = 2.5$, what direction is the particle moving?

(calc)

B.

(0, 2)

A car company introduces a new car for which the number of cars sold, S, is modeled by the function $S(t) = 1500 - \frac{45}{t+2}$ where t is time in months.

Find the average rate of change of cars sold over the first 6 months. (calc)

C.

2

If $g(x) = 2x^2 - 4x$ on the interval [0, 5], what is the absolute maximum of g(x)? (no calc)

D.

-10.677

For what value of c is the instantaneous rate of change for the function $f(x) = 2\sqrt{x}$ equal to the average rate of change on the interval $1 \le x \le 4$?

(no calc)

E.

-3/10

If $f(x) = (x + 2)^{2/3}$ on $[-5, 6]$, what is the absolute maximum of $f(x)$? (calc)

F.

-8.941

If c is the number that satisfies the conclusion of the Mean Value Theorem for $f(x) = x^3 - 4x^2$ on $[0, 2]$, the c = ?

(no calc)

G.

221.937

Find: $\lim_{x \to \infty} \frac{2x^2 + 3x}{x^3 + x + 1}$

(no calc)

H.

π

If $p(t) = e^{2t} - 6t$ represents the position function of a particle, when does the particle change directions? (calc)

I.

68.186

If f(x) is continuous on [a, b], what theorem can you use to find the absolute extrema of a function?

(no calc)

J.

right

x	0	2	3	4	6
$g(x)$	−3	1	5	2	1

g(x) is a differentiable function on the interval [0, 6]. On what interval is there guaranteed to be a value of c such that g'(c) =4? (no calc)

K.

1/4

$v(t) = (t + 1)(t + 3)^2$ is velocity of a particle where t is measured in minutes and v(t) is measured in inches per minute. Describe the speed of the particle at t = 2 minutes. (calc)

L.

9.894

$v(t) = (t - 1)(t - 3)^2$ is velocity of a particle where t is measured in minutes and v(t) is measured in inches per minute. At what interval is the particle moving to the right?

(no calc)

M. 9/4

If f(x) is continuous on [a, b] and differentiable on (a, b) and f(a) = f(b), what theorem can you use to find the value of c on (a, b) such that f'(c) = 0? (no calc)

N. 0.549

Find the point on the graph of $f(x) = \sqrt{-x + 10}$ so that the point (2, 0) is closest to the graph.

(no calc)

O. increasing

The area of a rectangle is 81 square feet. What dimensions of the rectangle would give the smallest perimeter? (no calc)

P. 2.813

Find:

$$\lim_{x \to 0} \frac{e^x - 1}{4x}$$

(no calc)

Q.

9 by 9

Find:

$$\lim_{x \to 1} \frac{x - 1}{\ln x - \sin(\pi x)}$$

(no calc)

R.

Rolle's

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x	0	2	4	6	8	10	12	14	16
$f(x)$	1	5	8	10	11	10	8	5	1

Find the average rate of change of f(x) on the interval [4, 14].

(no calc)

S.

0

If $f(x) = x^2 - 5x$ on the interval [0, 5], find the value of c such that $f'(c) = 0$.

(no calc)

T.

$(1, 3) \cup (3, \infty)$

A particle's position is given by $p(t) = e^t \cos t$, where $p(t)$ is measured in centimeters and t is measured in seconds. What is the instantaneous acceleration at $t = 1.5$?

(calc)

U.

Mean Value

Apply the Mean Value Theorem to find the value(s) of c guaranteed for $f(x) = x^3 - x^2 - 2x$ on $[-1, 1]$. (no calc)

V.

4

A particle moves along a line so that at time t, where $0 \le t \le \pi$, its position is given by $s(t) = -4\cos t - 2t$. What is the velocity of the particle when its acceleration is zero?

(no calc)

W.

(2, 6)

If the velocity function is given by $v(t) = \sin(\pi x)$, what is the acceleration of this particle at $t = 2$? (no calc)

X.

$$\frac{1}{1 + \pi}$$

Find the maximum volume of a box that can be made by cutting squares from the corners of an 12 inch by 18 inch rectangular sheet of cardboard and folding up the sides.

(calc)

Y. (2, 3)

A particle's position is given by $p(t) = e^t \cos t$, where p(t) is measured in centimeters and t is measured in seconds. What is the average velocity on [1, 3]? (calc)

Z. 2/3

If f(x) is continuous on [a, b] and differentiable on (a, b), then what theorem would you use to find $f'(c) = \frac{f(a) - f(b)}{a - b}$? (no calc)

AA. $(5/2, \sqrt{15/2})$

x	0	2	3	4	6
$g(x)$	−3	1	5	2	1

g(x) is a differentiable function on the interval [0, 6]. On what interval is there guaranteed to be a value of c such that g(c) = -1? (no calc)

BB. 5/2

If $p(t) = e^{2t} - 8t$ represents the position function of a particle, what is the total distance the particle travels on [0.5, 1.5]? (calc)

CC.

Extreme Value

x	0	2	3	4	6
$g(x)$	−3	1	5	2	1

g(x) is a differentiable function on the interval [0, 6]. On what interval is there guaranteed to be a value of c such that g'(c) =0? (no calc)

DD.

-1/3