3.14 Multiple Choice Problems on Applications of Derivatives

820. The value of c guaranteed to exist by the Mean Value Theorem for $V(x) = x^2$ in the interval $[0,3]$ is

A) 1 B) 2 C) $\frac{3}{2}$ D) $\frac{1}{2}$ E) None of these

821. If $P(x)$ is continuous in $[k,m]$ and differentiable in (k,m), then the Mean Value Theorem states that there is a point a between k and m such that

A) $\dfrac{P(k)-P(m)}{m-k} = P'(a)$

B) $P'(a)(k-m) = P(k) - P(m)$

C) $\dfrac{m-k}{P(m)-P(k)} = a$

D) $\dfrac{m-k}{P(m)-P(k)} = P'(a)$

E) None of these

822. The Mean Value Theorem does not apply to $f(x) = |x-3|$ on $[1,4]$ because

A) $f(x)$ is not continuous on $[1,4]$

B) $f(x)$ is not differentiable on $(1,4)$

C) $f(1) \neq f(4)$

D) $f(1) > f(4)$

E) None of these

823. Which of the following function fails to satisfy the conclusion of the Mean Value Theorem on the given interval?

A) $3x^{2/3} - 1;\ [1,2]$

B) $|3x-2|;\ [1,2]$

C) $4x^3 - 2x + 3;\ [0,2]$

D) $\sqrt{x-2};\ [3,6]$

E) None of these

824. If a function F is differentiable on $[-4,4]$, then which of the following statements is true?

A) F is not continuous on $[-5,5]$

B) F is not differentiable on $[-5,5]$

C) $F'(c) = 0$ for some c in the interval $[-4,4]$

D) The conclusion of the Mean Value Theorem applies to F

E) None of these

825. The function $G(x) = \dfrac{(x-2)(x-3)}{x-1}$ does not satisfy the hypothesis of Rolle's Theorem on the interval $[-3,2]$ because

A) $G(-3) = G(2) = 0$

B) $G(x)$ is not differentiable on $[-3,2]$

C) $G(x)$ is not continuous on $[-3,2]$

D) $G(0) \neq 0$

E) None of these

826. The function F below satisfies the conclusion of Rolle's Theorem in the interval $[a,b]$ because

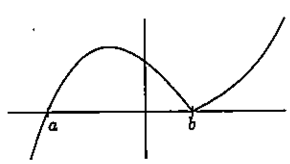
A) F is continuous on $[a,b]$

B) F is differentiable on (a,b)

C) $F(a) = F(b) = 0$

D) All three statements A, B and C

E) None of these



827. The intervals for which the function $F(x) = x^4 - 4x^3 + 4x^2 + 6$ increases are

A) $x < 0,\ 1 < x < 2$

B) only $x > 2$

C) $0 < x < 1,\ x > 2$

D) only $0 < x < 1$

E) only $1 < x < 2$

828. If $Q(x) = (3x+2)^3$, then the third derivative of Q at $x = 0$ is

A) 0 B) 9 C) 54 D) 162 E) 224

829. The function $M(x) = x^4 - 4x^2$ has

A) one relative minimum and two relative maxima

B) one relative minimum and one relative maximum

C) no relative minima and two relative maxima

D) two relative minima and no relative maxima

E) two relative minima and one relative maximum

830. The total number of all relative extrema of the function F whose derivative is $F'(x) = x(x-3)^2(x-1)^4$ is

A) 0 B) 1 C) 2 D) 3 E) None of these

831. The function $F(x) = x^{2/3}$ on $[-8,8]$ does not satisfy the conditions of the Mean Value Theorem because

A) $F(0)$ does not exist

B) F is not continuous on $[-8,8]$

C) $F(1)$ does not exist

D) F is not defined for $x < 0$

E) $F'(0)$ does not exist

832. If c is the number defined by Rolle's Theorem, then for $R(x) = 2x^3 - 6x$ on the interval $0 \le x \le \sqrt{3}$, c must be

A) 1 B) -1 C) ± 1 D) 0 E) $\sqrt{3}$

833. Find the sum of the values of a and b such that $F(x) = 2ax^2 + bx + 3$ has a relative extremum at $(1,2)$.

A) $\frac{3}{2}$ B) $\frac{5}{2}$ C) 1 D) -1 E) None of these

834. Which of the following statements are true of the graph of $F(x)$ shown below?

I. There is a horizontal asymptote at $y = 0$.
II. There are three inflection points.
III. There are no absolute extrema.

A) I only

B) I, II only

C) I, III only

D) II, III only

E) None are true