AP Calculus Multiple Choice Questions - Chapter 5

1 If $f'(x) = (x - 2)(x - 3)^2(x - 4)^3$, then f has which of the following relative extrema?

I. A relative maximum at x = 2

II. A relative minimum at x = 3

III. A relative maximum at x = 4

a I only
b III only
c I and III only
d II and III only
e I, II, and III

	5.1

2 Which of the following values is the absolute minimum value of the function $f(x) = 4x - x^2 + 6$ on the interval [0, 4]?

a 0
b 2
c 4
d 6
e 10

	5.1

3 If f is a continuous, decreasing function on [0, 10] with a critical point at (4, 2), which of the following statements must be false?

a f(10) is an absolute minimum of f on [0, 10]
b f(4) is neither a relative maximum nor a relative minimum
c f'(4) does not exist
d f'(4) = 0
e f'(4) < 0

	5.1

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1 If f(x) = cos x, then the Mean Value Theorem guarantees that somewhere between 0 and π/3, f'(x) =

a -3 / 2π
b -sqrt(3) / 2
c -1
d 0
e 1 / 2

5.2a

2 On what interval is the function $g(x) = e^{x^3+6x^2+8}$ decreasing?

a (-∞, 2]
b [0, 4]
c [2, 4]
d (4, ∞)
e No Interval

5.2a

3 All of the following functions satisfy the conditions of the Mean Value Theorem on the interval [-1, 1] except

a sin(x)
b $\sin^{-1}(x)$
c $x^{5/3}$
d $x^{3/5}$
e x / (x - 2)

5.2a

AP Calculus Multiple Choice Questions - Chapter 5

1 Find all possible function f with the given derivative
f'(x) = x

5.2b

a $x^2 + C$
b x / 2 + C
c $x^2 / 2 + C$
d 2x + C

2 Find all possible function f with the given derivative
f'(x) = 2

5.2b

a x / 2 + C
b 2 + C
c x + C
d 2x + C

3 Find all possible function f with the given derivative
f'(x) = sin(x)

5.2b

a -cos(x) + C
b sin(x) + C
c cos(x) + C
d -sin(x) + C

AP Calculus Multiple Choice Questions - Chapter 5

	5.3a

1 Which of the following statements about the function $f(x) = x^4 - 2x^3$ is true?

a The function has no relative extrema

b The graph of the function has one point of inflection and the function has two relative extrema

c The graph of the function has two points of inflection and the function has one relative extrema

d The graph of the function has two points of inflection and the function has two relative extrema

e The graph of the function has two points of inflection and the function has three relative extrema

	5.3a

2 The function f given by $f(x) = 2x^3 - 3x^2 - 12x$ has a relative minimum at x =

a -1

b 0

c 2

d $\frac{3 - \sqrt{105}}{4}$

e $\frac{3 + \sqrt{105}}{4}$

	5.3a

3 The function $f(x) = x^4 + 3x^3 - 2x^2 - 4x + 8$ has a relative minimum at x =

a 1.385

b 15.282

c -0.525

d -10.585

e 0.765

AP Calculus Multiple Choice Questions - Chapter 5

1 Let f be the function given by $f(x) = x^3 - 6x^2$. The graph of f is concave up when

a $x > 2$
b $x < 2$
c $0 < x < 4$
d $x < 0$ or $x > 4$ only
e $x > 6$ only

	5.3b

2 If $a < 0$, the graph of $y = ax^3 + 3x^2 + 4x + 5$ is concave up on

a $(-\infty, -1/a)$
b $(-\infty, 1/a)$
c $(-1/a, \infty)$
d $(1/a, \infty)$
e $(-\infty, -1)$

	5.3b

3 The x-coordinates of the points of inflection of the graph of $y = x^5 - 5x^4 + 3x + 7$ are

a 0 only
b 1 only
c 3 only
d 0 and 3
e 0 and 1

	5.3b

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x	1.1	1.2	1.3	1.4
f(x)	4.18	4.38	4.56	4.73

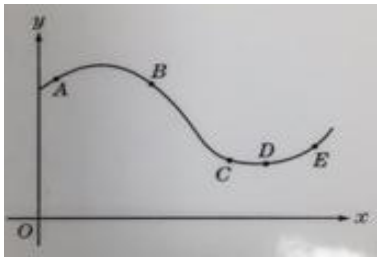
	5.3c

1 Let f be a function such that f''(x) < 0 for all x in the closed interval [1,2]. Selected values of f are shown in the table above. Which of the following must be true about f'(1.2)?

a f'(1.2) < 0
b 0 < f'(1.2) < 1.6
c 1.6 < f'(1.2) < 1.8
d 1.8 < f'(1.2) < 2.0
e f'(1.2) > 2.0

	5.3c

2

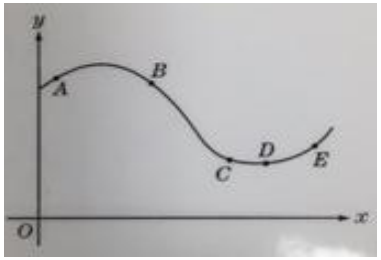


At which of the five points on the graph in the figure above are dy/dx and d^2y/dx^2 both negative?

a A
b B
c C
d D
e E

	5.3c

3



At which of the five points on the graph in the figure above is dy/dx positive but d^2y/dx^2 negative?

a A
b B
c C
d D
e E

AP Calculus Multiple Choice Questions - Chapter 5

1 What is the linearization of $f(x) = e^x$ at $x = 1$?

a $y = e$
b $y = ex$
c $y = e^x$
d $y = x - e$
e $y = e(x - 1)$

5.5a

2 What is the linearization of $f(x) = \sqrt{1 + x}$ at $a = 0$?

a $y = 1 + x$
b $y = 0.5 + x$
c $y = 1 - 0.5x$
d $y = 1 + 0.5x$

5.5a

3 Use the linear approximation $(1 + x)^k \sim 1 + kx$ to find an approximation for the function $f(x) = (1 - x)^o$ for values of x near zero

a $1 - 6x$
b $1 + 6x$
c $6 + 6x$
d $6 - 6x$

5.5a

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1 A differentiable function f has the property that f(5) = 3 and f'(5) = 4. What is the estimate for f(4.8) using a local liner approximation for f at x = 5?

	5.5b

a 2.2 **b** 2.8
c 3.4 **d** 3.8
e 4.6

2 For the function f, f'(x) = 2x + 1 and f(1) = 4. What is the approximation for f(1.2) found by using the line tangent to the graph of f at x = 1?

	5.5b

a 0.6 **b** 3.4
c 4.2 **d** 4.6
e 4.64

3 Approximate the root by using a linearization centered at an appropriate nearby number $26^{1/3}$

	5.5b

a 3.285 **b** 3.058
c 2.541 **d** 2.962

AP Calculus Multiple Choice Questions - Chapter 5

1 If y = tan(x), x = π, and dx = 0.5, what does dy equal?

a -0.25 **b** -0.5

c 0 **d** 0.5

e 0.25

	5.5c

2 The radius r of a circle increases from a = 10 m to 10.1 m. Use a linearization to estimate the increase in the circle's area A. Compare this estimate with the true change ΔA.

a 0.0314 **b** 3.14

c 0.314 **d** 0.00314

	5.5c

3 Inflating a bicycle tire changes its radius from 12 inches to 13 inches. Use a linearization to estimate the absolute change.

a 0.063 inches **b** 6.3 inches

c 63 inches **d** 0.63 inches

	5.5c

AP Calculus Multiple Choice Questions - Chapter 5

3 If Newton's method is used to find the zero of $f(x) = x - x^3 + 2$, what is the third estimate if the first estimate is 1?

		5.5d

a -3 / 4
b 3 / 2
c 8 / 5
d 18 / 11
e 3

4 Use Newton's Method to solve $x^3 + 3x + 1 = 0$

		5.5d

a -0.322
b 0.322
c 0.655
d -0.655

5 Use Newton's Method to solve $x^4 + x - 3 = 0$

		5.5d

a x = 1.45, x = -1.16
b x = 1.45, x = 1.16
c x = -1.45, x = 1.16
d x = -1.45, x = -1.16

AP Calculus Multiple Choice Questions - Chapter 5

	5.6

1 If the volume of a cube is increasing at 24 in^3/min and each edge of the cube is increasing at 2 in/min, what is the length of each edge of the cube?

a 2 in
b 2.82 in
c 2.29 in
d 4 in
e 8 in

	5.6

2 If the volume of a cube is increasing at 24 in^3/min and the surface area of the cube is increasing at 12 in^2/min, what is the length of each edge of the cube?

a 2 in
b 2.82 in
c 2.29 in
d 4 in
e 8 in

	5.6

3 A cylindrical rubber cord is stretched at a constant rate of 2 cm per second. Assuming the radius is the same along the entire length and its volume does not change, how fast is its radius shrinking when its length is 100 cm and its radius is 1 cm?

a 0 cm/sec
b 0.01 cm/sec
c 0.02 cm/sec
d 2 cm/sec
e 3.979 cm/sec