Q 01 LIMITS ★☆☆

What is the limit?

```
lim (x→3) (x² - 9) / (x - 3)
```

A 3

B 6

C 9

D Does not exist

Q 02 LIMITS ★☆☆

Find the limit.

```
lim (x→0) sin(x) / x
```

A 0

B 1

C ∞

D Does not exist

Q 03 LIMITS ★☆☆

Evaluate the limit.

```
lim (x→2) (3x + 1)
```

A 6

B 7

C 8

D 9

Q 04 LIMITS ★☆☆

What is the limit as x approaches infinity?

```
lim (x→∞) (5x² + 3) / (2x² - 1)
```

A 0

B 5/2

C 5

D ∞

Q 05 CONTINUITY ★☆☆

A function f is continuous at x = a if which THREE conditions hold?

A f(a) exists; lim(x→a) f exists; lim(x→a) f = f(a)

B f(a) exists; f is differentiable; f is bounded

C f is increasing; limit exists; f(a) > 0

D f'(a) = 0; limit exists; f is periodic

Q 06 LIMITS ★★☆

Evaluate the limit.

```
lim (x→0) (1 - cos x) / x
```

A 0

B 1/2

C 1

D Does not exist

Q 07 LIMITS ★★☆

What is the limit?

```
lim (x→4) (√x - 2) / (x - 4)
```

- **A** 0
- **B** 1/4
- **C** 1/2
- **D** Does not exist

Q 08 LIMITS ★★☆

Find the one-sided limit.

```
lim (x→0⁺) 1/x
```

- **A** 0
- **B** 1
- **C** $-\infty$
- **D** $+\infty$

Q 09 CONTINUITY ★★☆

$f(x) = (x^2-4)/(x-2)$ for $x \neq 2$, and $f(2) = k$. What value of k makes f continuous at $x = 2$?

- **A** 0
- **B** 2
- **C** 4
- **D** 6

Q 10 LIMITS ★★☆

Evaluate the limit.

```
lim (x→∞) (4x³ - x) / (7x³ + 2x²)
```

A 0

B 4/7

C 7/4

D ∞

Q 11 LIMITS ★★☆

What is lim(x→∞) e^(−x)?

```
lim (x→∞) e^(-x)
```

A 0

B 1

C e

D ∞

Q 12 LIMITS ★★☆

The Intermediate Value Theorem states that if f is continuous on [a, b] and N is between f(a) and f(b), then:

A f has a maximum on [a,b]

B there exists c in (a,b) such that f(c) = N

C f is differentiable on (a,b)

D f(a) = f(b)

Q 13 LIMITS ★★★

Evaluate the limit using L'Hôpital's Rule.

```
lim (x→0) (e^x - 1) / x
```

A 0

B 1

C e

D Does not exist

Q 14 LIMITS ★★★

Find the limit.

```
lim (x→∞) x · sin(1/x)
```

A 0

B 1

C ∞

D Does not exist

Q 15 CONTINUITY ★★★

Which type of discontinuity occurs when lim(x→a) f(x) exists but does NOT equal f(a)?

A Jump discontinuity

B Removable discontinuity

C Infinite discontinuity

D Essential discontinuity

Q 16 DERIVATIVES ★☆☆

The derivative of f at x = a is defined as:

```
f'(a) = lim (h→0) [f(a+h) - f(a)] / h
```

A Average rate of change on [a, b]

B Instantaneous rate of change at x = a

C Area under f between a and a+h

D Second derivative at x = a

Q 17 DERIVATIVES ★☆☆

Find f'(x) if f(x) = x^5.

```
f(x) = x^5
```

A 5x

B $5x^4$

C x^4

D $4x^5$

Q 18 DERIVATIVES ★☆☆

What is d/dx(sin x)?

```
d/dx (sin x) = ?
```

A −cos x

B cos x

C −sin x

D tan x

Q 19 DERIVATIVES ★☆☆

What is d/dx(e^x)?

```
d/dx (e^x) = ?
```

A xe^{x-1}

B e^x

C e

D $e^x \cdot \ln e$

Q 20 DERIVATIVES ★☆☆

What is d/dx(ln x)?

```
d/dx (ln x) = ?
```

A 1/x

B ln x

C x

D e^x

Q 21 DERIVATIVES ★★☆

Find the derivative using the Product Rule: $f(x) = x^2 \cdot \sin x$.

```
f(x) = x^2 · sin x
```

A $2x + \cos x$

B $2x\cdot\sin x + x^2\cdot\cos x$

C $2x\cdot\cos x$

D $x^2\cdot\cos x$

Q 22 DERIVATIVES ★★☆

Find f'(x) using the Quotient Rule: $f(x) = (x^2 + 1) / (x - 3)$.

```
f(x) = (x^2 + 1) / (x - 3)
```

A $(2x(x-3) - (x^2+1)) / (x-3)^2$

B $(2x(x-3) + (x^2+1)) / (x-3)^2$

C $2x / 1$

D $(x^2-6x-1) / (x-3)^2$

Q 23 DERIVATIVES ★★☆

Apply the Chain Rule: find $d/dx[\sin(3x^2)]$.

```
d/dx [ sin(3x^2) ]
```

A $\cos(3x^2)$

B $6x \cdot \cos(3x^2)$

C $-6x \cdot \cos(3x^2)$

D $3x \cdot \cos(3x^2)$

Q 24 DERIVATIVES ★★☆

Find dy/dx using implicit differentiation: $x^2 + y^2 = 25$.

```
x^2 + y^2 = 25
```

A x/y

B $-x/y$

C y/x

D $-y/x$

Q 25 DERIVATIVES ★★☆

A particle moves so that its position is $s(t) = t^3 - 6t^2 + 9t$. What is its velocity at $t = 2$?

```
s(t) = t^3 - 6t^2 + 9t
```

A −3

B 0

C 3

D 9

Q 26 DERIVATIVES ★★☆

What is d/dx(tan x)?

```
d/dx (tan x) = ?
```

A sec x

B $\sec^2 x$

C $-\csc^2 x$

D −sec x tan x

Q 27 DERIVATIVES ★★☆

Find the slope of the tangent to $f(x) = 2x^3 - 3x$ at $x = 1$.

```
f(x) = 2x^3 - 3x, x = 1
```

A −1

B 0

C 3

D 6

Q 28 DERIVATIVES ★★☆

Find dy/dx if $y = \ln(x^2 + 1)$.

```
y = ln(x^2 + 1)
```

A $1/(x^2+1)$

B $2x/(x^2+1)$

C $\ln(2x)$

D $2/(x^2+1)$

Q 29 DERIVATIVES ★★★

Find $d/dx[e^x \cdot \cos x]$.

```
d/dx [ e^x · cos x ]
```

A $e^x(\cos x - \sin x)$

B $e^x(\cos x + \sin x)$

C $-e^x \sin x$

D $e^x \cos x$

Q 30 DERIVATIVES ★★★

What is the second derivative of $f(x) = x^4 - 3x^2$?

```
f(x) = x^4 - 3x^2
```

A $4x^3-6x$

B $12x^2-6$

C $12x$

D $4x^3$

Q 31 DERIVATIVES ★★★

Use the Chain Rule: find d/dx[e^(x^2)].

```
d/dx [ e^(x^2) ]
```

A $2x \cdot e^{x^2}$

B e^{x^2}

C $x^2 \cdot e^{x^2}$

D $2e^{x^2}$

Q 32 DERIVATIVES ★★★

Find dy/dx by implicit differentiation: $xy + y^2 = 5$.

```
xy + y^2 = 5
```

A $-y / (x + 2y)$

B $y / (x + 2y)$

C $-y / (2y - x)$

D $y / (2y + x)$

Q 33 APPLICATIONS ★☆☆

A function has a critical point where:

A f(x) = 0

B f'(x) = 0 or f'(x) is undefined

C f''(x) > 0

D f(x) > f'(x)

Q 34 APPLICATIONS ★★☆

The First Derivative Test says: if $f'(x)$ changes from positive to negative at $x = c$, then f has a:

A Local minimum

B Local maximum

C Inflection point

D Saddle point

Q 35 APPLICATIONS ★★☆

The Second Derivative Test: if $f'(c) = 0$ and $f''(c) > 0$, then f has a:

A Local maximum

B Inflection point

C Local minimum

D No conclusion

Q 36 APPLICATIONS ★★☆

An inflection point of f occurs where:

A $f'(x) = 0$

B $f(x) = 0$

C $f''(x)$ changes sign

D $f'(x)$ changes sign

Q 37 APPLICATIONS ★★☆

The Mean Value Theorem states that if f is continuous on [a,b] and differentiable on (a,b), then there exists c in (a,b) such that:

```
f'(c) = [f(b) - f(a)] / (b - a)
```

A f(c) = 0

B f'(c) = 0

C f'(c) = [f(b)−f(a)]/(b−a)

D f(a) = f(b)

Q 38 APPLICATIONS ★★☆

Find the absolute maximum of $f(x) = -x^2 + 4x$ on [0, 5].

```
f(x) = -x^2 + 4x, x ∈ [0, 5]
```

A 0

B 4

C 5

D -5

Q 39 APPLICATIONS ★★☆

A particle moves along a line with position $s(t) = t^3 - 6t^2 + 9t$. When is it at rest?

```
s(t) = t^3 - 6t^2 + 9t
```

A t = 0 and t = 3

B t = 1 and t = 3

C t = 2 and t = 4

D t = 0 only

Q 40 APPLICATIONS ★★☆

If $f''(x) > 0$ on an interval, the graph of f is:

- **A** Decreasing
- **B** Increasing
- **C** Concave down
- **D** Concave up

Q 41 APPLICATIONS ★★★

A 10 ft ladder leans against a wall. The base slides away at 2 ft/sec. How fast is the top sliding down when the base is 6 ft from the wall?

```
x^2 + y^2 = 100
```

- **A** −1.5 ft/sec
- **B** −3/2 ft/sec
- **C** −3/2 ft/sec
- **D** Both A and B

Q 42 APPLICATIONS ★★★

Maximize the product of two positive numbers whose sum is 20.

```
x + y = 20, maximize P = xy
```

- **A** P = 80 at x=8, y=12
- **B** P = 100 at x=10, y=10
- **C** P = 96 at x=4, y=16
- **D** P = 75 at x=5, y=15

Q 43 APPLICATIONS ★★★

Find the linearization (tangent line approximation) of $f(x) = \sqrt{x}$ at $x = 9$.

```
L(x) = f(9) + f'(9)(x - 9)
```

A $L(x) = 3 + (1/6)(x-9)$

B $L(x) = 3 + (1/3)(x-9)$

C $L(x) = 9 + 3(x-3)$

D $L(x) = 3x$

Q 44 APPLICATIONS ★★★

Using Newton's Method, the update formula x_{n+1} is:

```
x_{n+1} = x_n - f(x_n) / f'(x_n)
```

A $x_n - f(x_n)/f'(x_n)$

B $x_n + f(x_n)/f'(x_n)$

C $x_n \cdot f'(x_n)/f(x_n)$

D $f(x_n)/f'(x_n)$

Q 45 APPLICATIONS ★★★

$f(x) = x^3 - 3x$. On which interval is f both decreasing AND concave up?

```
f(x) = x^3 - 3x
```

A $(-\infty, -1)$

B $(-1, 0)$

C $(0, 1)$

D $(1, \infty)$

Q 46 INTEGRALS ★☆☆

$\int x^n \, dx = ?$ $(n \neq -1)$

```
∫ x^n dx = ?
```

A $nx^{n-1} + C$

B $x^{n+1} + C$

C $x^{n+1}/(n+1) + C$

D $x^n/n + C$

Q 47 INTEGRALS ★☆☆

Evaluate $\int \cos x \, dx$.

```
∫ cos x dx
```

A $-\sin x + C$

B $\sin x + C$

C $-\cos x + C$

D $\tan x + C$

Q 48 INTEGRALS ★☆☆

Evaluate $\int e^x \, dx$.

```
∫ e^x dx
```

A $e^x/x + C$

B $xe^x + C$

C $e^x + C$

D $e + C$

Q 49 INTEGRALS ★☆☆

$\int (1/x)\,dx = ?$

```
∫ (1/x) dx
```

A $x^{-2}/2 + C$

B $\ln|x| + C$

C $1/x^2 + C$

D $x + C$

Q 50 INTEGRALS ★★☆

Evaluate $\int (3x^2 + 2x - 5)\,dx$.

```
∫ (3x^2 + 2x - 5) dx
```

A $6x + 2$

B $x^3 + x^2 - 5x + C$

C $3x^3 + 2x^2 - 5x + C$

D $x^3 + x^2 + C$

Q 51 INTEGRALS ★★☆

Use u-substitution to evaluate $\int 2x(x^2+1)^4\,dx$.

```
∫ 2x(x^2 + 1)^4 dx
```

A $(x^2+1)^5 + C$

B $(x^2+1)^5/5 + C$

C $2(x^2+1)^5/5 + C$

D $5(x^2+1)^4 + C$

Q 52 INTEGRALS ★★☆

Evaluate ∫ sin(3x) dx.

```
∫ sin(3x) dx
```

A cos(3x) + C

B −cos(3x) + C

C −cos(3x)/3 + C

D 3cos(3x) + C

Q 53 FTC ★★☆

The Fundamental Theorem of Calculus Part 1 states: if $F(x) = \int_a^x f(t)\,dt$, then:

```
F(x) = ∫_a^x f(t) dt → F'(x) = ?
```

A F'(x) = f(a)

B F'(x) = f(t)

C F'(x) = f(x)

D $F'(x) = \int_a^x f'(t)\,dt$

Q 54 FTC ★★☆

Evaluate the definite integral.

```
∫₀² (3x^2) dx
```

A 6

B 8

C 12

D 24

Q 55 FTC ★★☆

The Fundamental Theorem Part 2: $\int_a^b f(x)\,dx = F(b) - F(a)$, where F is an antiderivative of f. Evaluate:

```
∫₀^(π/2) cos x dx
```

A 0

B 1

C π/2

D 2

Q 56 INTEGRALS ★★☆

Evaluate $\int_1^4 (1/\sqrt{x})\,dx$.

```
∫_1^4 x^(-1/2) dx
```

A 1

B 2

C 3

D 4

Q 57 INTEGRALS ★★★

Evaluate using u-substitution: ∫ e^(sin x) · cos x dx.

```
∫ e^(sin x) · cos x dx
```

A e^(sin x)·cos x + C

B e^(sin x) + C

C sin x·e^(cos x) + C

D $\cos(e^x) + C$

Q 58 FTC ★★★

Apply FTC Part 1 with the Chain Rule: find d/dx[∫ ₀^(x^2) sin(t) dt].

```
d/dx [ ∫_0^(x^2) sin(t) dt ]
```

- **A** sin(x)
- **B** sin(x^2)
- **C** 2x·sin(x^2)
- **D** cos(x^2)

Q 59 INTEGRALS ★★★

Evaluate ∫ x·e^x dx using Integration by Parts.

```
∫ x · e^x dx
```

- **A** x·e^x + C
- **B** e^x(x−1) + C
- **C** e^x/x + C
- **D** x^2e^x/2 + C

Q 60 INTEGRALS ★★★

Evaluate $\int_0^1 (2x+1)^3$ dx.

```
∫_0^1 (2x+1)^3 dx
```

- **A** 10
- **B** 20
- **C** 30
- **D** 40

Q 61 AREA/VOLUME ★★☆

The area between $f(x) = x^2$ and $g(x) = x$ on $[0,1]$ is:

```
A = ∫_0^1 [x - x^2] dx
```

A 1/6

B 1/3

C 1/2

D 1

Q 62 AREA/VOLUME ★★☆

Find the area between $y = \sin x$ and the x-axis from $x = 0$ to $x = \pi$.

```
A = ∫_0^π sin x dx
```

A 0

B 1

C 2

D π

Q 63 AREA/VOLUME ★★★

The volume of the solid formed by revolving $f(x) = x$ about x-axis on $[0,2]$ is (Disk Method):

```
V = π ∫_0^2 x^2 dx
```

A $4\pi/3$

B $8\pi/3$

C 4π

D 8π

Q 64 AREA/VOLUME ★★★

Shell Method volume for revolving $y = x^2$ about the y-axis from $x = 0$ to $x = 2$:

```
V = 2π ∫_0^2 x · x^2 dx
```

A 8π

B 16π/5

C 8π/5

D 32π/5

Q 65 AREA/VOLUME ★★★

Average value of $f(x) = x^2$ on $[1, 3]$:

```
f_{avg} = (1/(3-1)) ∫_1^3 x^2 dx
```

A 8/3

B 13/3

C 9

D 26/3

Q 66 AREA/VOLUME ★★★

Find the area enclosed by $y = x^2 - 4$ and $y = 0$.

```
y = x^2 - 4 and y = 0
```

A 8/3

B 16/3

C 32/3

D 8

Q 67 FTC ★★★

Given $\int_0^5 f(x)dx = 12$ and $\int_0^3 f(x)dx = 7$, find $\int_3^5 f(x)dx$.

A 5

B 12

C 19

D −5

Q 68 INTEGRALS ★★★

A car decelerates so its velocity is $v(t) = 60 - 10t$ ft/sec. Total distance traveled from t=0 to t=6:

```
distance = ∫_0^6 |60 - 10t| dt
```

A 120 ft

B 180 ft

C 240 ft

D 360 ft

Q 69 DIFF. EQUATIONS ★★☆

Solve the separable differential equation: dy/dx = y.

```
dy/dx = y
```

A y = x + C

B y = Ce^x

C y = e^(Cx)

D y = ln x + C

Q 70 DIFF. EQUATIONS ★★☆

Solve: $dy/dx = 2xy$ with $y(0) = 1$.

```
dy/dx = 2xy, y(0) = 1
```

A $y = e^{(x^2)}$

B $y = e^{(2x)}$

C $y = x^2 + 1$

D $y = 2x$

Q 71 DIFF. EQUATIONS ★★★

The general solution of $dy/dx = ky$ is exponential growth/decay:

```
dy/dx = ky
```

A $y = k + C$

B $y = Ce^{(kx)}$

C $y = kx^2 + C$

D $y = C\sin(kx)$

Q 72 DIFF. EQUATIONS ★★★

A population doubles in 10 years. If $P_0=500$, the growth model $P(t)$ satisfies $P(10)=1000$. Find k.

```
P(t) = 500 e^(kt), P(10) = 1000
```

A $k = \ln 2$

B $k = \ln 2/10$

C $k = 2/10$

D $k = 10/\ln 2$

Q 73 DIFF. EQUATIONS ★★★

Euler's Method: given dy/dx = x + y, y(0)=1, step h=0.1, find y(0.1).

```
y_{new} = y_{old} + h · f(x_{old}, y_{old})
```

A 1.0

B 1.1

C 1.2

D 1.01

Q 74 DIFF. EQUATIONS ★★★

Solve: $dy/dx = (x^2)/y$, with $y(0) = 2$.

```
dy/dx = x^2 / y
```

A $y = x^3/3 + 2$

B $y^2 = 2x^3/3 + 4$

C $y = \sqrt{(2x^3/3+4)}$

D $y = x^3$

Q 75 PARAMETRIC ★★★

For parametric equations $x=t^2$, $y=t^3$, find dy/dx.

```
x = t^2, y = t^3
```

A $2t/3t^2$

B $3t^2/2t$

C $3t/2$

D $t/2$

Q 76 PARAMETRIC ★★★

Arc length of parametric curve: $x=\cos t$, $y=\sin t$, from $t=0$ to $t=2\pi$.

```
L = ∫_0^{2π} √[(dx/dt)^2 + (dy/dt)^2] dt
```

A 1

B π

C 2π

D 4π

Q 77 POLAR ★★★

Convert $r = 2$ to rectangular form.

```
r = 2
```

A $x + y = 2$

B $x^2 + y^2 = 4$

C $x^2 + y^2 = 2$

D $y = 2x$

Q 78 POLAR ★★★

Area enclosed by polar curve $r = 3$ from $\theta = 0$ to $\theta = 2\pi$:

```
A = (1/2) ∫_0^{2π} r^2 dθ
```

A 3π

B 9π

C 18π

D 6π

Q 79 INTEGRALS ★★★

Evaluate ∫ tan x dx.

```
∫ tan x dx
```

A $\sec^2 x + C$

B $\ln|\cos x| + C$

C $-\ln|\cos x| + C$

D $\ln|\sin x| + C$

Q 80 INTEGRALS ★★★

Evaluate ∫ $\sec^2 x$ dx.

```
∫ sec^2 x dx
```

A 2sec x tan x + C

B sec x + C

C tan x + C

D −cot x + C

Q 81 INTEGRALS ★★★

Evaluate $\int_{-1}^{1} x^3\,dx$.

```
∫_{-1}^{1} x^3 dx
```

A 0

B 1/4

C 1/2

D 2

Q 82 FTC ★★★

If $F(x) = \int_1^x t^2\,dt$, what is F'(3)?

```
F(x) = ∫_1^x t^2 dt
```

A 3

B 6

C 9

D 27

Q 83 DERIVATIVES ★★★

Differentiate y = x^x using logarithmic differentiation.

```
y = x^x
```

A x·x^(x−1)

B x^x · ln x

C x^x(1 + ln x)

D x^x / ln x

Q 84 DERIVATIVES ★★★

Find d/dx[arctan x].

```
d/dx [ arctan(x) ] = ?
```

A $1/\sqrt{(1-x^2)}$

B $-1/\sqrt{(1-x^2)}$

C $1/(1+x^2)$

D $1/(1-x^2)$

Q 85 DERIVATIVES ★★★

Find d/dx[arcsin x].

```
d/dx [ arcsin(x) ] = ?
```

A $1/\sqrt{(1-x^2)}$

B $-1/\sqrt{(1-x^2)}$

C $1/(1+x^2)$

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

Q 86 APPLICATIONS ★★★

A box with square base and open top is to have volume 32 cm^3. What base side length minimizes surface area?

```
V = x^2 h = 32, S = x^2 + 4xh
```

A $x = 2$

B $x = 4$

C $x = 2\sqrt[3]{4}$

D $x = 8$

Q 87 APPLICATIONS ★★★

Water drains from a conical tank at 2 m^3/min. Cone: radius R=4m, height H=8m. How fast does the water level drop when depth h=4m?

```
V = (π/3)r^2 h, r/h = 4/8 = 1/2
```

A −2/π m/min

B −8/(4π) m/min

C −2/(π) m/min

D Both A and C

Q 88 LIMITS ★★★

Evaluate using L'Hôpital's Rule:

```
lim (x→0) (x - sin x) / x^3
```

A 0

B 1/6

C 1/3

D 1

Q 89 INTEGRALS ★★★

$\int (x^2 - 1)/(x + 1)\,dx$ — simplify first.

```
∫ (x^2 - 1)/(x + 1) dx
```

A $x^2/2 + C$

B $x^2/2 - x + C$

C $\ln|x+1| + C$

D $(x-1)^2/2 + C$

Q 90 FTC ★★★

The Net Change Theorem: $\int_a^b F'(x)\,dx = ?$

- **A** F(a)
- **B** F(b)
- **C** F(b) + F(a)
- **D** F(b) − F(a)

Q 91 APPLICATIONS ★★★

A function f is increasing on [a,b] when:

- **A** f''(x) > 0 on (a,b)
- **B** f'(x) > 0 on (a,b)
- **C** f(a) > 0
- **D** f(b) > f''(b)

Q 92 DERIVATIVES ★★★

Find all x where $f(x) = x^3 - 3x^2 - 9x + 5$ is increasing.

```
f(x) = x^3 - 3x^2 - 9x + 5
```

- **A** (−1, 3)
- **B** (−∞,−1)∪(3,∞)
- **C** (0, ∞)
- **D** (−3, 1)

Q 93 INTEGRALS ★★★

Evaluate $\int 2x/(x^2+1)\,dx$.

```
∫ 2x/(x^2 + 1) dx
```

A $\ln(x^2+1) + C$

B $\arctan(x) + C$

C $2\arctan(x) + C$

D $1/(x^2+1) + C$

Q 94 INTEGRALS ★★★

Evaluate $\int_0^{(\pi/4)} \sec^2 x\,dx$.

```
∫_0^{π/4} sec^2 x dx
```

A 0

B 1/2

C 1

D $\sqrt{2}$

Q 95 DERIVATIVES ★★★

Find the equation of the tangent line to $y = e^x$ at $x = 0$.

```
y = e^x at x = 0
```

A y = x

B y = x + 1

C y = ex + 1

D y = 1

Q 96 DIFF. EQUATIONS ★★★

Logistic growth model: dP/dt = kP(M−P). As t→∞, the population approaches:

```
dP/dt = kP(M - P)
```

A 0

B k

C M

D ∞

Q 97 INTEGRALS ★★★

Evaluate $\int 1/(1+x^2)$ dx.

```
∫ 1/(1+x^2) dx
```

A $\ln(1+x^2) + C$

B arctan(x) + C

C arcsin(x) + C

D −arctan(x) + C

Q 98 APPLICATIONS ★★★

Rolles's Theorem requires f to be continuous on [a,b], differentiable on (a,b), and f(a) = f(b). Its conclusion is:

A f has an absolute maximum on [a,b]

B there exists c in (a,b) with f'(c) = 0

C f is constant on [a,b]

D f'(a) = f'(b)

Q 99 INTEGRALS ★★★

The displacement of a particle from $t=0$ to $t=4$ if $v(t) = t^2 - 4t$ is:

```
displacement = ∫_0^4 (t^2 - 4t) dt
```

A -32/3

B 0

C 32/3

D 16

Q 100 SYNTHESIS ★★★

If $\int_0^4 f(x)dx = 10$ and f is even, what is $\int_{-4}^4 f(x)dx$?

```
f \ is \ even: \ f(-x) = f(x)
```

A 5

B 10

C 20

D 0

Answer Key

Q1: B	Q2: B	Q3: B	Q4: B	Q5: A
Q6: A	Q7: B	Q8: D	Q9: C	Q10: B
Q11: A	Q12: B	Q13: B	Q14: B	Q15: B
Q16: B	Q17: B	Q18: B	Q19: B	Q20: A
Q21: B	Q22: A	Q23: B	Q24: B	Q25: A
Q26: B	Q27: C	Q28: B	Q29: A	Q30: B
Q31: A	Q32: A	Q33: B	Q34: B	Q35: C
Q36: C	Q37: C	Q38: B	Q39: B	Q40: D
Q41: D	Q42: B	Q43: A	Q44: A	Q45: C
Q46: C	Q47: B	Q48: C	Q49: B	Q50: B
Q51: B	Q52: C	Q53: C	Q54: B	Q55: B
Q56: B	Q57: B	Q58: C	Q59: B	Q60: B
Q61: A	Q62: C	Q63: B	Q64: A	Q65: B
Q66: B	Q67: A	Q68: B	Q69: B	Q70: A
Q71: B	Q72: B	Q73: B	Q74: C	Q75: C
Q76: C	Q77: B	Q78: B	Q79: C	Q80: C
Q81: A	Q82: C	Q83: C	Q84: C	Q85: A
Q86: B	Q87: D	Q88: B	Q89: B	Q90: D
Q91: B	Q92: B	Q93: A	Q94: C	Q95: B
Q96: C	Q97: B	Q98: B	Q99: A	Q100: C