

Q1: What mathematical operation transforms a mathematical expression into another equivalent simple form?

- A) Integration
- B) Differentiation
- C) Transformation**
- D) Summation

Correct Answer: C

Q2: Who first introduced the Laplace transform?

- A) Fourier
- B) Heaviside
- C) Laplace**
- D) Newton

Correct Answer: C

Q3: What type of equations can be solved using algebraic methods with the help of Laplace transform?

- A) Quadratic equations
- B) Logarithmic equations
- C) Differential equations**
- D) Trigonometric equations

Correct Answer: C

Q4: What is the notation for the Laplace transform of a function $f(t)$?

A) $F(t)$

B) $f(s)$

C) $L[f(t)]$

D) $l(f(s))$

Correct Answer: C

Q5: What is the definition of the Laplace transform $L[f(t)]$?

A) Integral from 0 to infinity of $e^{-st} f(t) dt$

B) Integral from -infinity to infinity of $e^{-st} f(t) dt$

C) Integral from 0 to 1 of $e^{-st} f(t) dt$

D) Derivative of $e^{-st} f(t)$

Correct Answer: A

Q6: What is one of the sufficient conditions for the existence of the Laplace Transform of $f(t)$?

A) $f(t)$ must be a polynomial

B) $f(t)$ must be zero everywhere

C) $f(t)$ must be of exponential order

D) $f(t)$ must be an odd function

Correct Answer: C

Q7: What is the Laplace transform of the constant function $f(t) = 1$?

A) s

B) $1/s$

C) 1

D) e^{-s}

Correct Answer: B

Q8: What is the Laplace transform of the function $f(t) = e^{at}$?

A) $1 / (s + a)$

B) $1 / (s - a)$

C) $s / (s^2 + a^2)$

D) $a / (s^2 + a^2)$

Correct Answer: B

Q9: What is the Laplace transform of the function $f(t) = \sin(at)$?

A) $s / (s^2 + a^2)$

B) $a / (s^2 + a^2)$

C) $s / (s^2 - a^2)$

D) $a / (s^2 - a^2)$

Correct Answer: B

Q10: What is the Laplace transform of the function $f(t) = \cos(at)$?

A) $s / (s^2 + a^2)$

B) $a / (s^2 + a^2)$

C) $s / (s^2 - a^2)$

D) $a / (s^2 - a^2)$

Correct Answer: A

Q11: What does the linearity property of Laplace Transform state for $L[f(t) + g(t)]$?

A) $L[f(t)] * L[g(t)]$

B) $L[f(t)] / L[g(t)]$

C) $L[f(t)] + L[g(t)]$

D) $L[f(t)] - L[g(t)]$

Correct Answer: C

Q12: According to the First Shifting Theorem, if $L[f(t)] = F(s)$, what is $L[e^{(-at)} f(t)]$?

A) $F(s - a)$

B) $F(s + a)$

C) $e^{(-as)} F(s)$

D) $F(s) / a$

Correct Answer: B

Q13: What is the definition of the unit step function $U(t-a)$?

A) 0 for $t < a$, 1 for $t > a$

B) 1 for $t < a$, 0 for $t > a$

C) 0 for $t < 0$, 1 for $t > 0$

D) t for $t < a$, a for $t > a$

Correct Answer: A

Q14: What is the Laplace transform of the unit step function $U(t-a)$?

A) e^{-as} / s

B) e^{as} / s

C) $1 / (s + a)$

D) e^{-as}

Correct Answer: A

Q15: If $L[f(t)] = F(s)$, what is the inverse Laplace transform of $F(s)$?

A) $f(s)$

B) $F(t)$

C) $f(t)$

D) $1/f(t)$

Correct Answer: C

Q16: What is the inverse Laplace transform of $1/s$?

A) t

B) 1

C) e^t

D) $\sin(t)$

Correct Answer: B

Q17: What is the inverse Laplace transform of $1/(s-a)$?

A) $e^{(-at)}$

B) $e^{(at)}$

C) $\sin(at)$

D) $\cos(at)$

Correct Answer: B

Q18: What is the definition of the Z-transform $Z[f(n)]$ for $n \geq 0$?

A) Summation from $n=0$ to infinity of $f(n) * z^n$

B) Summation from $n=0$ to infinity of $f(n) * z^{(-n)}$

C) Integral from 0 to infinity of $f(n) * z^{(-n)} dn$

D) Summation from $n=-\infty$ to infinity of $f(n) * z^{(-n)}$

Correct Answer: B

Q19: What is the Z-transform of the sequence $f(n) = a^n$ for $n \geq 0$?

A) $z / (z - a)$

B) $z / (z + a)$

C) $1 / (z - a)$

D) $a / (z - a)$

Correct Answer: A

Q20: What is the Z-transform of the unit impulse function $\delta(n)$, where $\delta(n)=1$ for $n=0$ and 0 otherwise?

A) z

B) $1/z$

C) 1

D) 0

Correct Answer: C

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