*

$$Z\{n2^n\} =$$

$$\frac{2z}{(z-2)^2}$$

- [x] Option 1

$$\frac{z}{2(z-1)^2}$$

- [ ] Option 2

$$\frac{2}{(z-2)^2}$$

- [ ] Option 3

$$\frac{2z}{(z-1)^2}$$

- [ ] Option 4

*

If $F_s(s), G_s(s)$ are the Fourier sine transforms of $f(x)$ and $g(x)$ respectively, then $\int\limits_0^\infty f(x)g(x)dx =$

$$\int\limits_0^\infty F_s(s)G_s(s)ds$$

- (x) Option 1

$$\int\limits_{-\infty}^\infty F_s(s)G_s(s)ds$$

- ( ) Option 2

$$\int\limits_0^\infty G_s(s)ds$$

- ( ) Option 3

$$\int\limits_0^\infty F_s(s)ds$$

- ( ) Option 4

*

If $F_s(f(x)) = \frac{e^{-3s}}{s}$, then $f(x)$ is

$\sqrt{\frac{2}{\pi}} \tan^{-1}\left(\frac{x}{3}\right)$ +c

Option 1

$\frac{2}{\pi} \tan\left(\frac{x}{3}\right)$ +c

Option 2

$\sqrt{\frac{2}{\pi}} \tan^{-1}\left(\frac{x}{9}\right) + c$

Option 3

$\frac{1}{\sqrt{2\pi}} \tan^{-1}\left(\frac{x^2}{3}\right) + c$

Option 4

*

$$Z\left[3a^4\right] =$$

$$\frac{3a^4}{z-1}$$

Option 1

$$\frac{3a^4 z}{z-1}$$

Option 2

$$\frac{3a^4 z}{z+1}$$

Option 3

$$\frac{3z}{z-1}$$

Option 4

*

If $f(x) = e^{-x}, g(x) = e^{-2x}$ then $\int\limits_0^\infty \frac{dx}{(x^2+1)(x^2+4)}$

$\frac{\pi}{4}$

Option 1

$\frac{\pi}{12}$

Option 2

$\frac{\pi}{6}$

Option 3

$\frac{\pi}{2}$

Option 4

*

If $Z\{f(n)\} = F(z)$ then $\lim_{z \to 1} (z-1)F(z) =$

$f(0)$

Option 1

$f(1)$

Option 2

$f(z)$

Option 3

$f(\infty)$

Option 4

*

Find Fourier cosine transform of $3e^{-2x}$

$$\sqrt{\frac{2}{\pi}}\left[\frac{6}{s^2+2^2}\right]$$

- [x] Option 1

$$\sqrt{\frac{2}{\pi}}\left[\frac{3}{s^2+2^2}\right]$$

- [ ] Option 2

$$\sqrt{\frac{1}{\pi}}\left[\frac{6}{s^2+2^2}\right]$$

- [ ] Option 3

$$\sqrt{\frac{1}{\pi}}\left[\frac{3}{s^2+2^2}\right]$$

- [ ] Option 4

*

The value of Z-transform of $a^n \cos n\pi$ is

$$\frac{1}{z+a}$$

Option 1

$$\frac{z}{z-a}$$

Option 2

$$\frac{z}{z+a}$$

Option 3

$$\frac{1}{z-a}$$

Option 4

*

Using Long division method, if $Z^{-1}\left(\frac{1+2z^{-1}}{1-z^{-1}}\right)$ then $f(n)$ is

.

$$f(n)=\begin{cases}0 & n=0\\ 3 & n\geq 1\end{cases}$$

Option 1

$$f(n)=\begin{cases}1 & n=0\\ 3 & n\geq 1\end{cases}$$

Option 2

$$f(n)=\begin{cases}1 & n=0\\ 3 & n>1\end{cases}$$

Option 3

$$f(n)=\begin{cases}1 & n=0\\ -3 & n\geq 1\end{cases}$$

Option 4

*

The value of $Z\left\{\frac{7^n}{n!}\right\}$ is

$$e^{\left(\frac{1}{z}\right)}$$

- [ ] Option 1

$$e^{\left(\frac{7}{z}\right)}$$

- [x] Option 2

$$e^{-\left(\frac{1}{z}\right)}$$

- [ ] Option 3

$$e^{-\left(\frac{7}{z}\right)}$$

- [ ] Option 4

*

$$Z^{-1}\left[\frac{1}{z-\frac{1}{3}}\right] =$$

$$3^n - 1$$

Option 1

$$3^{n-1}$$

Option 2

$$\left(\frac{1}{3}\right)^{n-1}$$

Option 3

$$\left(\frac{1}{3}\right)^{n}$$

Option 4

*

$$F_c[f(x)\cos ax] =$$

$\frac{1}{2}[F_s(s+a)+F_s(s-a)]$

Option 1

$\frac{1}{2}[F_s(s+a)-F_s(s-a)]$

Option 2

$\frac{1}{2}[F_c(s+a)+F_c(s-a)]$

Option 3

$\frac{1}{2}[F_c(s+a)-F_c(s-a)]$

Option 4

*

$$F\{f(x) * g(x)\} =$$

$$F(s) + G(s)$$

- [ ] Option 1

$$F(s) - G(s)$$

- [ ] Option 2

$$F(s).G(s)$$

- [x] Option 3

$$F(s)/G(s)$$

- [ ] Option 4

*

The solution of $u_n = 5u_{n-1},\ n \geq 1$ and $u_0 = 2$ is

$u_n = 5^n$

Option 1

$u_n = 5.2^n$

Option 2

$u_n = 2.5^n$

Option 3

$u_n = 2^n$

Option 4

*

If $F_s(s)$ is the Fourier sine transform of $f(x)$, then

$$\int_0^\infty |f(x)|^2 dx = \int_0^\infty |F_s(s)|^2 ds$$

Option 1

$$\int_{-\infty}^\infty |f(x)|^2 dx = \int_{-\infty}^\infty |F_s(s)|^2 ds$$

Option 2 (selected)

$$\int_{-\infty}^\infty |f(x)| dx = \int_{-\infty}^\infty |F_s(s)| ds$$

Option 3

$$\int_0^\infty |f(x)| dx = \int_0^\infty |F_s(s)| ds$$

Option 4

*

Find Fourier cosine transform of $coshx - sinhx$

$$F_c(s) = \sqrt{\frac{2}{\pi}}\left(\frac{1}{s+1}\right)$$

Option 1

$$F_c(s) = \sqrt{\frac{2}{\pi}}\left(\frac{1}{s^2+1}\right)$$

Option 2

$$F_c(s) = \sqrt{\frac{2}{\pi}}\left(\frac{2}{s^2+1}\right)$$

Option 3

$$F_c(s) = \sqrt{\frac{2}{\pi}}\left(\frac{1}{s^2+2}\right)$$

Option 4

*

The infinite Fourier transform of a function $f(x)$ is

$$\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} f(x)e^{ist}dt$$

Option 1

$$\frac{1}{\sqrt{2\pi}}\int_{0}^{\infty} f(x)e^{ist}dt$$

Option 2

$$\frac{1}{\sqrt{\pi}}\int_{-\infty}^{\infty} f(x)e^{isx}dx$$

Option 3

$$\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} f(x)e^{isx}dx$$

Option 4

*

The value of $Z\left\{e^{-7n}\right\}$ is

$$\frac{z}{z-e^{-7}}$$

- [ ] Option 1

$$\frac{z}{z+e^{-7}}$$

- [x] Option 2

$$\frac{z}{z-e^{-1}}$$

- [ ] Option 3

$$\frac{z}{z+e^{-1}}$$

- [ ] Option 4

*

The inversion theorem for infinite Fourier sine transform is

$$f(x) = \sqrt{\frac{2}{\pi}} \int_0^{\infty} F_s(s) \sin sx ds$$

Option 1

$$f(x) = \sqrt{\frac{2}{\pi}} \int_{-\infty}^{\infty} F_s(s) \sin sx ds$$

Option 2

$$f(x) = \frac{2}{\pi} \int_0^{\infty} F_s(s) \sin sx ds$$

Option 3

$$f(x) = \frac{2}{\sqrt{\pi}} \int_0^{\infty} F_s(s) \sin sx ds$$

Option 4

*

If $x(n+1)-2x(n)=1$ with $x(0)=0$ then the value of $x(n)$ is

2^n+2

Option 1

2^n

Option 2

2^n+1

Option 3

2^n-1

Option 4

*

$$F\{e^{iax}f(x)\} =$$

$$F(s-a)$$

Option 1

$$F(s+a)$$

Option 2

$$F(sa)$$

Option 3

$$F(\frac{s}{a})$$

Option 4

*

If $F\{f(x)\} = F(s)$, then $F\{x^2 f(x)\} =$

$-\frac{d^2}{ds^2}F(s)$

Option 1

$\frac{d^2}{ds^2}F(s)$

Option 2

$(i)\frac{d^2}{ds^2}F(s)$

Option 3

$\frac{d}{ds}F(s)$

Option 4

*

$$F_s\{f(ax)\} =$$

$$\frac{1}{a}F_s(\frac{s}{a})$$

- [x] Option 1

$$\frac{1}{s}F_s(\frac{s}{a})$$

- [ ] Option 2

$$\frac{1}{s}F_s(\frac{a}{s})$$

- [ ] Option 3

$$\frac{1}{s}F_s(\frac{1}{a})$$

- [ ] Option 4

*

If $Z\{f(n)\} = F(z)$ then $Z\{f(n-7)\} =$

$$z^{7}F(z)$$

Option 1

$$z^{-7}F\left(\frac{z}{7}\right)$$

Option 2

$$z^{-7}F(z)$$

Option 3

$$z^{-7}F\left(\frac{7}{z}\right)$$

Option 4

*

If $F(z) = \dfrac{5z}{(z-1)(z-2)}$ then the residue of $F(z)z^{n-1}$ at $z = 2$ is

5.2^{n-1}

Option 1

$5.\dfrac{1}{2^n}$

Option 2

5.2^n

Option 3

5.2^{n+1}

Option 4

*

If $Z\{f(n)\} = F(z)$ and $Z\{g(n)\} = G(z)$ then $Z\{f(n) * g(n)\} =$

$F(z) - G(z)$

- [ ] Option 1

$F(z) + G(z)$

- [ ] Option 2

$F(z)/G(z)$

- [ ] Option 3

$F(z).G(z)$

- [x] Option 4

*

The Fourier sine transform of $\frac{1}{x}$ is

$$\sqrt{\frac{2}{\pi}}$$

Option 1

$$\sqrt{\frac{1}{\pi}}$$

Option 2

$$\sqrt{\frac{\pi}{2}}$$

Option 3

$$\sqrt{\frac{\pi}{4}}$$

Option 4

*

The Fourier transform of $f(x) = e^{-\frac{x^2}{2}}$ is

$\frac{1}{e^{x^2}}$

- [ ] Option 1

$e^{\frac{s^2}{2}}$

- [x] Option 2

e^{s^2}

- [ ] Option 3

$e^{-\frac{s^2}{2}}$

- [ ] Option 4

*

The value of $Z\left[\frac{1}{8^n}\right]$ is

$$\frac{8z}{z-1}$$

Option 1

$$\frac{z}{8z-1}$$

Option 2

$$\frac{z}{z-1}$$

Option 3

$$\frac{8z}{8z-1}$$

Option 4

*

The inversion formula for Fourier cosine transform of $e^{-ax}, a > 0$.

$$\int_0^\infty \frac{s}{a^2+s^2} ds = \frac{\pi}{2} e^{-ax}$$

Option 1

$$\int_0^\infty \frac{s}{a^2+s^2} \sin sx ds = -\frac{\pi}{2} e^{ax}$$

Option 2

$$\int_0^\infty \frac{\cos sx}{a^2+s^2} ds = \frac{\pi}{2a} e^{-ax}$$

Option 3

$$\int_0^\infty \frac{\cos sx}{a^2+s^2} ds = -\frac{\pi}{2a} e^{ax}$$

Option 4

*

$$F_s\{af(x) + bg(x)\} =$$

$aF_s\{f(x)\} + bF_s\{g(x)\}$

- [x] Option 1

$F_s\{f(x)\} + F_s\{g(x)\}$

- [ ] Option 2

$aF_s\{f(x)\} + F_s\{g(x)\}$

- [ ] Option 3

$F_s\{f(x)\} + bF_s\{g(x)\}$

- [ ] Option 4

*

Find Fourier sine transform of $5e^{-2x} + 2e^{-5x}$

$\sqrt{\frac{2}{\pi}}\left[\frac{5s}{s^2+4^2} + \frac{2s}{s^2+5^2}\right]$

- [ ] Option 1

$\sqrt{\frac{2}{\pi}}\left[\frac{5s}{s^2+4} + \frac{2s}{s^2+25}\right]$

- [x] Option 2

$\sqrt{\frac{1}{\pi}}\left[\frac{5s}{s^2+4} + \frac{2s}{s^2+25}\right]$

- [ ] Option 3

$\sqrt{\frac{1}{\pi}}\left[\frac{5s}{s^2+4^2} + \frac{2s}{s^2+25^2}\right]$

- [ ] Option 4

*

$$Z\left[a^{n+6}\right] =$$

$$\frac{a^6 z}{z-a}$$

- [x] Option 1

$$\frac{a^{-6} z}{z-a}$$

- [ ] Option 2

$$\frac{a^6 z}{z+a}$$

- [ ] Option 3

$$\frac{z}{z-a}$$

- [ ] Option 4

*

If $f(n) = \dfrac{2^{n+1}}{n!}$ then $f(0) =$

0

Option 1

2

Option 2

∞

Option 3

1

Option 4

*

If $Z\{f(n)\} = F(z)$ then the value of $Z[2^n f(n)]$ is

$$F\left(\frac{z}{2}\right)$$

- [x] Option 1

$$F\left(\frac{a}{z}\right)$$

- [ ] Option 2

$$F(2z)$$

- [ ] Option 3

$$F\left(\frac{2}{z}\right)$$

- [ ] Option 4

*

Given $f(0)=0, f(1)=1, f(2)=-2, f(3)=3, f(4)=-4, \ldots$. Find the general term of the sequence $f(n)$ where $f(n)=Z^{-1}[F(z)]$

$$(-1)^{n-1}n$$

- [x] Option 1

$$(-1)^{n}n$$

- [ ] Option 2

$$(-1)^{n+1}n^2$$

- [ ] Option 3

$$(-1)^{n-1}n^2$$

- [ ] Option 4

*

Under Fourier sine transform of $f(x) = \frac{1}{\sqrt{x}}$ is

cosine function

- [ ] Option 1

self-reciprocal function

- [x] Option 2

inverse function

- [ ] Option 3

complex function

- [ ] Option 4

*

If $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$ then the value of $Z\left[y(n)\right] =$

$$\frac{z}{(z-2)(z+3)^2}$$

- [x] Option 1

$$\frac{z}{(z+2)(z+3)^2}$$

- [ ] Option 2

$$\frac{z}{(z-2)(z-3)^2}$$

- [ ] Option 3

$$\frac{1}{(z-2)(z+3)^2}$$

- [ ] Option 4

*

The Fourier cosine transform of e^{-7x} is

$$\sqrt{\frac{1}{\pi}}\frac{7}{7^2+s^2}$$

Option 1

$$\sqrt{\frac{2}{\pi}}\frac{7}{7^2+s^2}$$

Option 2

$$\sqrt{\frac{1}{\pi}}\frac{s}{7^2+s^2}$$

Option 3

$$\sqrt{\frac{2}{\pi}}\frac{s}{7^2+s^2}$$

Option 4

*

If $y_{n+1} - 3y_n = 0$ with $y_0 = 1$ then the value of $y(n)$ is

$3n$

Option 1

3^n

Option 2

3^{n-1}

Option 3

$2n + 1$

Option 4

*

If $F\{f(x)\} = F(s)$ and $a > 0$, then the change of scale property is

$$F\{f(ax)\} = \frac{1}{a}F\left(\frac{s}{a}\right)$$

- [x] Option 1

$$F\{e^{iax}f(x)\} = F(s+a)$$

- [ ] Option 2

$$F\{f(x-a)\} = e^{isa}F(s)$$

- [ ] Option 3

$$F[af(x)+bg(x)] = aF[f(x)] + bF[g(x)]$$

- [ ] Option 4

*

$$F_s[f(x)\cos ax] =$$

$\frac{1}{2}[F_s(s+a)+F_s(s-a)]$

- (x) Option 1

$\frac{1}{2}[F_s(s+a)-F_s(s-a)]$

- ( ) Option 2

$\frac{1}{2}[F_c(s+a)+F_c(s-a)]$

- ( ) Option 3

$\frac{1}{2}[F_c(s+a)-F_c(s-a)]$

- ( ) Option 4

*

Use initial value theorem, if $F(z) = \dfrac{10z}{(z-1)(z-2)}$ then the value of $f(0)$ is

1

- [ ] Option 1

2

- [ ] Option 2

3

- [ ] Option 3

0

- [x] Option 4

*

Find the Fourier transform of $f(x) = \begin{cases} 1, & \text{in} \quad |x| < 2 \\ 0, & \text{in} \quad |x| > 2 \end{cases}$

$$\sqrt{\frac{2}{\pi}}\frac{\sin 2x}{x}$$

- [x] Option 1

$$\frac{2}{\pi}\frac{\sin 2s}{s}$$

- [ ] Option 2

$$\sqrt{\frac{2}{\pi}}\frac{\sin 2s}{s}$$

- [ ] Option 3

$$\frac{1}{\sqrt{2\pi}}\frac{\sin 2s}{s}$$

- [ ] Option 4

*

The value of $Z\left\{\frac{1}{n}\right\}, n \geq 1$ is

$$\log\left(\frac{z}{z-1}\right)$$

Option 1

$$\log\left(\frac{z}{z+1}\right)$$

Option 2

$$\log\left(\frac{z+1}{z}\right)$$

Option 3

$$\log\left(\frac{z-1}{z^2}\right)$$

Option 4

*

The convolution of two functions $f(x)$ and $g(x)$ is defined as $f * g =$

$$\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} f(t)g(x-t)dt$$

- [x] Option 1

$$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(t)g(x-t)dt$$

- [ ] Option 2

$$\frac{1}{\sqrt{2\pi}} \int_{0}^{\infty} f(t)g(x-t)dt$$

- [ ] Option 3

$$\frac{1}{\sqrt{2}} \int_{-\infty}^{\infty} f(t)g(x-t)dt$$

- [ ] Option 4

*

Using initial value theorem, if $F(z) = \frac{z}{z-1} + \frac{z}{z^2+1}$ then the value of $f(0)$ is

0

Option 1

1

Option 2

2

Option 3

3

Option 4

*

$$F_c[xf(x)] =$$

$$\frac{d}{ds}F_s(s)$$

- [x] Option 1

$$-\frac{d}{ds}F_s(s)$$

- [ ] Option 2

$$\frac{d}{ds}F_c(s)$$

- [ ] Option 3

$$-\frac{d}{ds}F_c(s)$$

- [ ] Option 4

*

$$Z^{-1}\left[\frac{5z}{(z-5)^2}\right] =$$

5^{n-1}

Option 1

$n5^{n+1}$

Option 2

5^{n+1}

Option 3

$n5^{n}$

Option 4

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