PRINTABLE VERSION

Quiz 8

You scored 50 out of 100

Question 1

Your answer is INCORRECT.

Give the Laplace transform of the solution to

$$[y' + 3y = 4e^{5x} - 2\sin(2x), \quad y(0) = 5]$$

a) $Y(s) = \frac{4}{(s-3)(s-5)} - \frac{4}{(s-3)(s^2+4)} + \frac{5}{s-3}$

b) $Y(s) = \frac{4}{s-5} - \frac{4}{s^2+4} - \frac{5}{s+3}$

c) $Y(s) = \frac{4}{(s+3)(s-5)} - \frac{4}{(s+3)(s^2+4)} - \frac{5}{s+3}$

d) $Y(s) = \frac{4}{s-5} - \frac{4}{s^2+4} + 5$

e) $Y(s) = \frac{4}{s-5} - \frac{4}{s^2+4} - \frac{5}{s-3}$

f) None of the above.

Question 2

Your answer is CORRECT.

Use the Laplace transform to solve the initial-value problem:

$$[y'' + 5y' + 4y = 5e^{-5x}, \quad y(0) = -2, \quad y'(0) = 2]$$

a) $y(x) = -7e^{-4x} + \frac{5}{4}e^{-5x} + \frac{15}{4}e^{-x}$

b) $y(x) = e^{-4x} + \frac{5}{4}e^{-5x} - \frac{9}{4}e^{-x}$

c) $y(x) = \frac{7}{3}e^{-4x} + \frac{5}{4}e^{-5x} - \frac{43}{12}e^{-x}$

d) $y(x) = -\frac{5}{3}e^{-4x} + \frac{5}{4}e^{-5x} - \frac{19}{12}e^{-x}$

e) $y(x) = -\frac{1}{3}e^{-4x} + \frac{5}{4}e^{-5x} - \frac{35}{12}e^{-x}$

f) None of the above.

Question 3

Your answer is CORRECT.

Give the Laplace transform of

$$f(x) = \begin{cases} -4x - 3 & 0 \le x \text{ and } x < 4 \\ -2 & 4 \le x \end{cases}$$

a) $F(s) = -\frac{1}{s^2} + \frac{2}{s} + e^{-4s}\left(\frac{5}{s} - \frac{2}{s^2}\right)$

b) $F(s) = \frac{2}{s^2} + \frac{1}{s} + e^{-4s}\left(\frac{4}{s} - \frac{3}{s^2}\right)$

c) $F(s) = -\frac{3}{s^2} - \frac{3}{s} + e^{-4s}\left(\frac{1}{s} - \frac{3}{s^2}\right)$

d) $F(s) = -\frac{4}{s^2} - \frac{3}{s} + e^{-4s}\left(\frac{17}{s} + \frac{4}{s^2}\right)$

e) $F(s) = \frac{2}{s^2} + \frac{3}{s} + e^{-4s}\left(-\frac{7}{s} + \frac{1}{s^2}\right)$

f) None of the above.

Question 4

Your answer is CORRECT.

Give the Laplace transform of

$$f(x) = \begin{cases} 2x^2 & 0 \le x \text{ and } x < 4 \\ 3 & 4 \le x \end{cases}$$

a) $F(s) = -\frac{1}{s^3} + e^{-4s}\left(-\frac{27}{s^3} + \frac{1}{s^2} - \frac{20}{s}\right)$

b) $F(s) = \frac{4}{s^3} + e^{-4s}\left(-\frac{4}{s^3} - \frac{16}{s^2} - \frac{29}{s}\right)$

c) $F(s) = \frac{1}{s^3} + e^{-4s}\left(\frac{4}{s^3} + \frac{1}{s^2} - \frac{16}{s}\right)$

d) $F(s) = \frac{1}{s^3} + e^{-4s}\left(-\frac{2}{s^3} + \frac{3}{s^2} - \frac{16}{s}\right)$

e) $F(s) = \frac{2}{s^3} + e^{-4s}\left(-\frac{1}{s^3} + \frac{2}{s^2} - \frac{10}{s}\right)$

f) None of the above.

Question 5

Your answer is INCORRECT.

Give the Laplace transform of

$$f(x) = \begin{cases} -2 & 0 \le x \text{ and } x < 2 \\ x & 2 \le x \text{ and } x < 4 \\ 3 & 4 \le x \end{cases}$$

a) $F(s) = \frac{-3s - e^{-2s} + 3e^{-2s}s + e^{-4s} + 4e^{-4s}s}{s^2}$

b) $F(s) = -\frac{-3s + e^{-2s} + 9e^{-2s}s + e^{-4s} + 5e^{-4s}s}{s^2}$

c) $F(s) = -\frac{s + e^{-2s} + 8e^{-2s}s + e^{-4s} - 7e^{-4s}s}{s^2}$

d) $F(s) = -\frac{s + e^{-2s} + e^{-2s}s + e^{-4s} - 8e^{-4s}s}{s^2}$

e) $F(s) = \frac{-2s - e^{-4s} - e^{-4s}s + e^{-2s} + 4e^{-2s}s}{s^2}$

f) None of the above.

Question 6

Your answer is CORRECT.

Give the inverse Laplace transform of

$$F(s) = \frac{-4s - 3e^{-4s}}{s(s+2)}$$

as a function of *x*.
Note: The function *u* below is the unit step function, which is also known as the *Heaviside* function.

a) $f(x) = 4e^{-2x} - 2u(x-4) + 2u(x-4)e^{-2x+8}$

b) $f(x) = 4e^{-2x} + \frac{5}{2}u(x-4) - \frac{5}{2}u(x-4)e^{-2x+8}$

c) $f(x) = 2e^{-2x} - \frac{3}{2}u(x-4) + \frac{3}{2}u(x-4)e^{-2x+8}$

d) $f(x) = 5e^{-2x} - \frac{3}{2}u(x-4) + \frac{3}{2}u(x-4)e^{-2x+8}$

e) $f(x) = -4e^{-2x} - \frac{3}{2}u(x-4) + \frac{3}{2}u(x-4)e^{-2x+8}$

f) None of the above.

Question 7

Your answer is INCORRECT.

Give the inverse Laplace transform of

$$F(s) = \frac{3}{s} + \frac{e^{-4s}}{s^2} - \frac{3e^{-4s}}{s}$$

as a function of *x*.
Note: The function *u* below is the unit step function, which is also known as the *Heaviside* function.

a) $f(x) = 2u(x-4)x + 3 + u(x-4)$

b) $f(x) = -3u(x-4)x + 3 + 4u(x-4)$

c) $f(x) = -5u(x-4)x + 3 - 4u(x-4)$

d) $f(x) = 4u(x-4)x + 3 - u(x-4)$

e) $f(x) = u(x-4)x + 3 - 7u(x-4)$

f) None of the above.

Question 8

Your answer is CORRECT.

Give the inverse Laplace transform of

$$F(s) = \frac{-2s + (s-4)e^{-\pi s}}{s^2 + 25}$$

as a function of x.
Note: The function u below is the unit step function, which is also known as the *Heaviside* function.

a) $f(x) = -2\cos(5x) - 3u(x-\pi)\cos(5x) + u(x-\pi)\sin(5x)$

b) $f(x) = -2\cos(5x) - u(x-\pi)\cos(5x) + \frac{4}{5}u(x-\pi)\sin(5x)$

c) $f(x) = 2\sin(5x) - u(x-\pi)\cos(5x) + u(x-\pi)\sin(5x)$

d) $f(x) = 2\sin(5x) - u(x-\pi)\cos(5x) + \frac{7}{5}u(x-\pi)\sin(5x)$

e) $f(x) = -2e^{-5x} + u(x-\pi)\cos(5x) + \frac{2}{5}u(x-\pi)\sin(5x)$

f) None of the above.

Question 9

Your answer is INCORRECT.

Use Laplace Transforms to solve the initial value problem

$$[y' + 2y = f(x), y(0) = 0]$$

where

$$f(x) = \begin{cases} 4 & 0 \le x \text{ and } x < 2 \\ 2 & 2 \le x \end{cases}$$

a) $y(x) = \begin{cases} -2e^{-2x} + 2 & 0 \le x \text{ and } x < 2 \\ -2e^{-2x} + 1 + e^{4-2x} & 2 \le x \end{cases}$

b) $y(x) = \begin{cases} 2e^{-2x} - 2 & 0 \le x \text{ and } x < 2 \\ -2e^{-2x} + 1 + e^{4-2x} & 2 \le x \end{cases}$

c) $y(x) = \begin{cases} 2e^{-2x} - 2 & 0 \le x \text{ and } x < 2 \\ -2e^{-2x} + 1 - 3e^{4-2x} & 2 \le x \end{cases}$

d) $y(x) = \begin{cases} -2e^{-2x} - 2 & 0 \le x \text{ and } x < 2 \\ -2e^{-2x} + 1 - 3e^{4-2x} & 2 \le x \end{cases}$

e) $y(x) = \begin{cases} -2e^{-2x} + 2 & 0 \le x \text{ and } x < 2 \\ -2e^{-2x} - 1 + e^{4-2x} & 2 \le x \end{cases}$

f) None of the above.

Question 10

Your answer is INCORRECT.

Solve the system of equations.

$$\begin{bmatrix} 4x+3y=-5 \\ -3x-3y=-3 \end{bmatrix}$$

a) $\{x=8, y=-9\}$

b) $\{x=9, y=-8\}$

c) $\{x=8, y=9\}$

d) *The system does not have a solution.*

e) $\{x=-8, y=9\}$

f) None of the above.

Question 11

Your answer is CORRECT.

Solve the system of equations.

$$\begin{bmatrix} -4x-8y=-16 \\ x+2y=4 \\ \frac{1}{2}x+y=2 \end{bmatrix}$$

a) $[x=0, y=2]$

b) $[x=-2a-4, y=a,$ *a is any real number*$]$

c) $[x=4, y=0]$

d) *no solution*

e) $[x=-2a+4, y=a,$ *a is any real number*$]$

f) None of the above.

Question 12

Your answer is INCORRECT.

Solve the system of equations.

$$\begin{bmatrix} 4x+8y=8 \\ -x-2y=2 \\ -\frac{1}{2}x-y=1 \end{bmatrix}$$

a) $[x=0, y=-1]$

b) $[x=-2a-2, y=a,\ a \text{ is any real number}]$

c) $[x=-2, y=0]$

d) $[x=-2a+2, y=a,\ a \text{ is any real number}]$

e) *no solution*

f) None of the above.

Question 13

Your answer is CORRECT.

The following matrix is the row echelon form of the augmented matrix of a system of linear equations. Find all solutions of the system.

$$\left[\begin{array}{ccc|c} 1 & 2 & -4 & -2 \\ 0 & 1 & 4 & -3 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

a) $\{x=-20, y=5, z=-2\}$

b) *no solution*

c) $\{x=-2, y=-3, z=-2\}$

d) $\{x=-12, y=5, z=-2\}$

e) $\{x=12, y=-11, z=-2\}$

f) None of the above.

Question 14

Your answer is INCORRECT.

The following matrix is the row echelon form of the augmented matrix of a system of linear equations. Find all solutions of the system.

$$\left[\begin{array}{ccc|c} 1 & -4 & -4 & -4 \\ 0 & 1 & -3 & -3 \\ 0 & 0 & 0 & -4 \end{array}\right]$$

a) $\{x=0, y=0, z=1\}$

b) $\{x=-16+12a, y=-3-3a, z=a\}$, *a is any real number*

c) $\{x=-80, y=-15, z=-4\}$

d) $\{x=-20, y=9, z=-4\}$

e) $\{x=-16+16a, y=-3+3a, z=a\}$, *a is any real number*

f) None of the above.

Question 15

Your answer is CORRECT.

Give the value of *y* for the solution set to the system of equations

$$\left[\begin{array}{c} x+4y+2z=-1 \\ 2x+3y+2z=1 \\ 2x+y+z=-1 \end{array}\right]$$

a) $y=-7$

b) $y=-9$

c) $y=-8$

d) $y=-10$

e) *The system does not have a solution.*

f) None of the above.

Question 16

Your answer is CORRECT.

Give the solution set to the system of equations

$$\left[\begin{array}{c} 9x-4y-2z=5 \\ 4x-2y-2z=4 \\ 2x-y-z=2 \end{array}\right]$$

a) $[x=-2-3s, y=-5-4s, z=3-2s]$

b) $[x=-1-3s, y=-6-6s, z=-2s-2]$

c) $[x=-5-3s, y=-6-8s, z=4s-3]$

d) *The system does not have a solution.*

e) $[x=-2s-3, y=-8-5s, z=s]$

f) None of the above.

Question 17

Your answer is INCORRECT.

Give the solution set to the system of equations

$$\begin{bmatrix} 4x+y-2z=2 \\ -4x-2y+2z=1 \\ -2x-y+z=-1 \end{bmatrix}$$

a) *The system does not have a solution.*

b) $[x=-8+4s, y=-2+s, z=-4+s]$

c) $[x=-6+4s, y=4+2s, z=-3+5s]$

d) $[x=-4+4s, y=-1-s, z=-8+3s]$

e) $[x=-7+5s, y=-1+s, z=-7+5s]$

f) None of the above.

Question 18

Your answer is CORRECT.

Give the solution set to the system of equations

$$\begin{bmatrix} -2x-y-z=-8 \\ -2x-y-z=-8 \\ -2x-y-z=-8 \end{bmatrix}$$

a) $[x=-3t, y=8-4s+t, z=3s]$

b) $[x=-t+3s, y=8+s, z=3t+2s]$

c) $[x=-2t-2s, y=8-4s-2t, z=2t+s]$

d) *The system does not have a solution.*

e) $[x=s, y=8-2s-t, z=t]$

f) None of the above.

Question 19

Your answer is INCORRECT.

Give the value of k for which the system of equations below does not have a unique solution.

$$\begin{bmatrix} -3x+2y+z=-12 \\ -2x+2y+(1+k)z=-12 \\ x-y-z=6 \end{bmatrix}$$

a) $k=1$

b) $k=4$

c) $k=3$

d) $k=-2$

e) $k=2$

f) None of the above.

Question 20

Your answer is INCORRECT.

Find the solution of the initial-value problem.

$$[y'''-2y''-y'+2y=0, y(0)=-5, y'(0)=1, y''(0)=-3]$$

HINT: $y(x) = e^x$ is a solution of the differential equation.

a) $y=-3e^x-\frac{8}{3}e^{-x}-\frac{2}{3}e^{2x}$

b) $y=3e^x-\frac{8}{3}e^{-x}+\frac{2}{3}e^{2x}$

c) $y=-3e^x+\frac{8}{3}e^{-x}+\frac{2}{3}e^{2x}$

d) $y=-3e^x-\frac{8}{3}e^{-x}+\frac{2}{3}e^{2x}$

e) $y = -3e^{x} + \frac{2}{3}e^{-x} - \frac{8}{3}e^{2x}$

f) None of the above.