PRINTABLE VERSION

Quiz 4

You scored 95 out of 100

Question 1

Your answer is CORRECT.

There are functions of the form e^{rx} that solve the differential equation

$$y'' + 7y' + 10y = 0$$

Identify a fundamental set of solutions for this differential equation.

a) $\{e^{-5x}, e^{-2x}\}$

b) $\{e^{-2x}, e^{5x}\}$

c) $\{e^{-5x}, e^{2x}\}$

d) $\{e^{2x}, e^{5x}\}$

e) $\{x e^{-5x}, e^{-5x}\}$

f) None of the above.

Question 2

Your answer is INCORRECT.

There are functions of the form x^r that solve the differential equation

$$x^2y'' - xy' - 15y = 0$$

Give the solution to the initial value problem

$$\left[x^2y'' - xy' - 15y = 0 \;\; y(1) = 0 \;\; y'(1) = -2 \right]$$

a) $y = \frac{1}{4x^3} + \frac{1}{8}x^5$

b) $y = \frac{1}{8x^3} + \frac{1}{4}x^5$

c) $y = -\frac{1}{4}x^5 + \frac{1}{8x^3}$

d) $y=-\frac{1}{8}x^5+\frac{1}{4x^3}$

e) $y=-\frac{1}{8}x^5+\frac{1}{8x^3}$

f) None of the above.

Question 3

Your answer is CORRECT.

Given the differential equation

$$y''-\left(\frac{2}{x}\right)y'-\left(\frac{7}{x^2}\right)y=0$$

Find two values of r such that $y = x^r$ is a solution of the equation.

a) $r=\{1-2\sqrt{2},1+2\sqrt{2}\}$

b) $r=\left\{1-\frac{1}{2}\sqrt{37},\frac{3}{2}+2\sqrt{2}\right\}$

c) $r=\left\{\frac{3}{2}-2\sqrt{2},\frac{3}{2}+2\sqrt{2}\right\}$

d) $r=\left\{\frac{3}{2}-\frac{1}{2}\sqrt{23},\frac{3}{2}+\frac{1}{2}\sqrt{23}\right\}$

e) $r=\left\{\frac{3}{2}-\frac{1}{2}\sqrt{37},\frac{3}{2}+\frac{1}{2}\sqrt{37}\right\}$

f) None of the above.

Question 4

Your answer is CORRECT.

Show that $y_1(x) = e^{2x}$ and $y_2(x) = e^{-4x}$ are linearly independent on $I = (-\infty, \infty)$ and find a second order homogeneous equation having the pair as a fundemental set of solutions.

a) $y''-8y'+4y=0$

b) $y''-2y'-8y=0$

c) $y''+2y'-4y=0$

d) $y''-2y'+8y=0$

e) $y''+2y'-8y=0$

f) None of the above.

Question 5

Your answer is CORRECT.

Give the general solution to

$$y'' + 4y' + 8y = 0$$

a) $y = C_1 \cos(2x) - C_2 \sin(2x)$

b) $y = C_1 \cos(2x) + C_2 \sin(2x)$

c) $y = e^{2x}\left(C_1 \cos(2x) - C_2 \sin(2x)\right)$

d) $y = e^{-2x}\left(C_1 \cos(2x) + C_2 \sin(2x)\right)$

e) $y = C_1 e^{2x} + C_2 e^{2x}$

f) None of the above.

Question 6

Your answer is CORRECT.

Give the general solution to

$$y'' + y' - 6y = 0$$

a) $y = C_1 e^{-3x} + C_2 e^{2x}$

b) $y = C_1 e^{3x} + C_2 e^{2x}$

c) $y = C_1 e^{-3x} + C_2 e^{-2x}$

d) $y = C_1 e^{3x} + C_2 e^{-2x}$

e) $y = C_1 e^{-3x} + C_2 x e^{-3x}$

f) None of the above.

Question 7

Your answer is CORRECT.

Give the general solution to

$$y'' - 10y' + 25y = 0$$

a) $y = C_1 e^{-5x} + C_2 e^{5x}$

b) $y = C_1 e^{5x} + C_2 x e^{5x}$

c) $y = C_1 e^{-5x} + C_2 x e^{-5x}$

d) $y = C_1 e^{-5x} + C_2 x e^{5x}$

e) $y = C_1 e^{5x} + C_2$

f) None of the above.

Question 8

Your answer is CORRECT.

The function

$$-2x e^{-x}$$

is a solution to a second order linear homogenous differential equation with constant coefficients. Give the differential equation.

a) $y'' - 4y' + 4y = 0$

b) $y'' + 3y' + 2y = 0$

c) $y'' - 2y' + y = 0$

d) $y'' + 2y' + y = 0$

e) $y'' + 4y' + 4y = 0$

f) None of the above.

Question 9

Your answer is CORRECT.

The function

$$-3 e^{x} \cos(5x)$$

is a solution to a second order linear homogenous differential equation with constant coefficients. Give the differential equation.

a) $y'' - 10y' + 10y = 0$

b) $y'' - 2y' + 26y = 0$

c) $y'' - 6y' + 5y = 0$

d) $y'' - 2y' + 25y = 0$

e) $y'' + 2y' + 25y = 0$

f) None of the above.

Question 10

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' - 7y' + 10y = 0,\ y(0) = 1,\ y'(0) = 3]$$

a) $y = -\frac{2}{3}e^{2x} - \frac{1}{3}e^{5x}$

b) $y = \frac{1}{3}e^{2x} + \frac{2}{3}e^{5x}$

c) $y = \frac{2}{3}e^{2x} - \frac{1}{3}e^{5x}$

d) $y = \frac{1}{3}e^{2x} - \frac{2}{3}e^{5x}$

e) $y = \frac{2}{3}e^{2x} + \frac{1}{3}e^{5x}$

f) None of the above.

Question 11

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' - y' - 12y = 0,\ y(0) = 2,\ y'(0) = -3]$$

a) $y = \frac{11}{7}e^{4x} + \frac{3}{7}e^{-3x}$

b) $y = \frac{3}{7}e^{4x} + \frac{11}{7}e^{-3x}$

c) $y=\frac{3}{7}e^{4x}-\frac{11}{7}e^{-3x}$

d) $y=-\frac{3}{7}e^{4x}-\frac{11}{7}e^{-3x}$

e) $y=\frac{11}{7}e^{4x}-\frac{3}{7}e^{-3x}$

f) None of the above.

Question 12

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y''-6y'+9y=0,\ y(0)=-1,\ y'(0)=2]$$

a) $y=5e^{3x}-xe^{3x}$

b) $y=-e^{3x}+5xe^{3x}$

c) $y=-e^{3x}-10xe^{3x}$

d) $y=2e^{3x}-5xe^{3x}$

e) $y=5e^{3x}+2xe^{3x}$

f) None of the above.

Question 13

Your answer is CORRECT.

Find the solution of the initial value problem:

$$\left[y''+\frac{1}{4}y=0,\ y(\pi)=1,\ y'(\pi)=-3\right]$$

a) $y=6e^{\frac{1}{2}x}+xe^{\frac{1}{2}x}$

b) $y=e^{\frac{1}{2}x}+6xe^{\frac{1}{2}x}$

c) $y=6\cos\left(\frac{1}{2}x\right)+\sin\left(\frac{1}{2}x\right)$

d) $y = 6\cos\left(\frac{1}{2}x\right) - \sin\left(\frac{1}{2}x\right)$

e) $y = \cos\left(\frac{1}{2}x\right) + 6\sin\left(\frac{1}{2}x\right)$

f) None of the above.

Question 14

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' - 4y' + 13y = 0,\ y(0) = -3,\ y'(0) = -1]$$

a) $y = -3\cos(2x) + \frac{5}{3}\sin(2x)$

b) $y = \frac{5}{3}e^{2x} - 3xe^{3x}$

c) $y = e^{3x}\left(-3\cos(2x) + \frac{5}{3}\sin(2x)\right)$

d) $y = \frac{5}{3}e^{2x} + 6xe^{3x}$

e) $y = e^{2x}\left(-3\cos(3x) + \frac{5}{3}\sin(3x)\right)$

f) None of the above.

Question 15

Your answer is CORRECT.

Find a differential equation

$$y'' + ay' + by = 0$$

that is satisfied by the given functions:

$$[y_1(x) = 3\cos(6x),\ y_2(x) = \sin(6x)]$$

a) $y'' + 12y' + 36y = 0$

b) $y'' - 12y' + 36y = 0$

c) $y'' + 36y = 0$

d) $y'' - 36y = 0$

e) $y'' + 36y' = 0$

f) None of the above.

Question 16

Your answer is CORRECT.

Find a differential equation

$$y'' + ay' + by = 0$$

whose general solution is the given expression.

$$y = C_1 e^{4x} + C_2 e^{-2x}$$

a) $y'' + 2y' - 8y = 0$

b) $y'' + 4y' + 20y = 0$

c) $y'' + 8y' + 16y = 0$

d) $y'' + 16y' = 0$

e) $y'' - 2y' - 8y = 0$

f) None of the above.

Question 17

Your answer is CORRECT.

Find the general solution of

$$xy' + y = -3x$$

a) $y = -3x + Cx$

b) $y = -\frac{3}{2}x + \frac{C}{x}$

c) $y = -\frac{3}{2}x + Cx$

d) $y = -\frac{3}{x^3} + \frac{C}{x}$

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

f) None of the above.

Question 18

Your answer is CORRECT.

Give the general solution of

$$y' = \frac{y^2 - 4}{xy - 6y}$$

a) $\ln(y^2 - 4) = x^2 - 12x + C$

b) $y^2 - 4 = (x - 6)^2 + C$

c) $y^2 = C(x - 6)^2 + 4$

d) $y^2 - 4 = Ce^{x-6}$

e) $y^2 = C(x - 6) + 4$

f) None of the above.

Question 19

Your answer is CORRECT.

Give the general solution to

$$y' = \frac{6x^4 + y^4}{xy^3}$$

a) $y^4 = 24Cx^4 \ln(x) + x^4$

b) $y = 24x^4 \ln(x) + x^4 C$

c) $y = -\frac{1}{5}x^4 C + x^{24}$

d) $y^4 = 24x^4 \ln(x) + x^4 C$

e) $y = -\frac{1}{5}x^4 + Cx^{24}$

f) None of the above.

Question 20

Your answer is CORRECT.

Give the general solution to

$$-3y' + \frac{3y}{x} = xy^4$$

a) $\frac{1}{y^3} = \frac{1}{5}x^2 + \frac{C}{x^3}$

b) $y^4 = \frac{1}{4}x^2 + \frac{C}{x^3}$

c) $\frac{1}{y^3} = \frac{1}{4}x + \frac{C}{x^3}$

d) $y = \frac{1}{5}x + \frac{C}{x^3}$

e) $y = \frac{1}{5}x^2 + \frac{C}{x^3}$

f) None of the above.