PRINTABLE VERSION

Quiz 4

You scored 85 out of 100

Question 1

Your answer is CORRECT.

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

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

Identify a fundamental set of solutions for this differential equation.

a) $\{e^{-3x}, e^{2x}\}$

b) $\{e^{2x}, e^{3x}\}$

c) $\{e^{-3x}, e^{-2x}\}$

d) $\{e^{-2x}, e^{3x}\}$

e) $\{x e^{-3x}, e^{-3x}\}$

f) None of the above.

Question 2

Your answer is CORRECT.

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

$$x^2y''+2xy'-6y=0$$

Give the solution to the initial value problem

$$\left[\ x^2y''+2xy'-6y=0 \quad y(1)=0 \quad y'(1)=-4\ \right]$$

a) $y=\frac{4}{5x^3}-\frac{1}{5}x^2$

b) $y=-\frac{1}{5}x^2-\frac{4}{5x^3}$

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

d) $y=-\frac{4}{5}x^2-\frac{1}{5x^3}$

e) $y=\frac{1}{5x^3}-\frac{4}{5}x^2$

f) None of the above.

Question 3

Your answer is INCORRECT.

Given the differential equation

$$y''-\left(\frac{3}{x}\right)y'-\left(\frac{7}{x^2}\right)y=0$$

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

a) $r=\left\{2-\frac{1}{2}\sqrt{30},2+\frac{1}{2}\sqrt{30}\right\}$

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

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

d) $r=\left\{2-\sqrt{11},2+\sqrt{11}\right\}$

e) $r=\left\{2+\frac{1}{2}\sqrt{37},\frac{3}{2}-\sqrt{11}\right\}$

f) None of the above.

Question 4

Your answer is INCORRECT.

Show that $y_1(x) = e^{4x}$ and $y_2(x) = e^{-3x}$ are linearly independent on $I = (-\infty, \infty)$ and find a second order homogeneous equation having the pair as a fundemental set of solutions.

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

b) $y''+4y'-3y=0$

c) $y''-6y'+3y=0$

d) $y''-y'-12y=0$

e) $y''+y'-12y=0$

f) None of the above.

Question 5

Your answer is CORRECT.

Give the general solution to

$$y'' + 4y' + 5y = 0$$

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

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

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

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

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

f) None of the above.

Question 6

Your answer is CORRECT.

Give the general solution to

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

a) $y = C_1 e^{-5x} + C_2 e^{-2x}$

b) $y = C_1 e^{5x} + C_2 e^{-2x}$

c) $y = C_1 e^{-5x} + C_2 e^{2x}$

d) $y = C_1 e^{5x} + C_2 e^{2x}$

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

f) None of the above.

Question 7

Your answer is CORRECT.

Give the general solution to

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

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

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

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

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

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

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 INCORRECT.

The function

$$3 e^{-4x} \cos(2x)$$

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

a) $y''+4y'+25y=0$

b) $y''+8y'+20y=0$

c) $y''+6y'+8y=0$

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

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

f) None of the above.

Question 10

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y''-11y'+30y=0,\ y(0)=3,\ y'(0)=3]$$

a) $y=15e^{6x}-12e^{5x}$

b) $y=-12e^{6x}+15e^{5x}$

c) $y=-12e^{6x}-15e^{5x}$

d) $y=12e^{6x}-15e^{5x}$

e) $y=15e^{6x}+12e^{5x}$

f) None of the above.

Question 11

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y''-y'-30y=0,\ y(0)=3,\ y'(0)=-3]$$

a) $y=\frac{12}{11}e^{6x}+\frac{21}{11}e^{-5x}$

b) $y=\frac{21}{11}e^{6x}+\frac{12}{11}e^{-5x}$

c) $y=\frac{12}{11}e^{6x}-\frac{21}{11}e^{-5x}$

d) $y = -\frac{12}{11}e^{6x} - \frac{21}{11}e^{-5x}$

e) $y = \frac{21}{11}e^{6x} - \frac{12}{11}e^{-5x}$

f) None of the above.

Question 12

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' - 12y' + 36y = 0,\ y(0) = -3,\ y'(0) = 3]$$

a) $y = -3e^{6x} + 21xe^{6x}$

b) $y = 21e^{6x} - 3xe^{6x}$

c) $y = -3e^{6x} - 42xe^{6x}$

d) $y = 6e^{6x} - 21xe^{6x}$

e) $y = 21e^{6x} + 6xe^{6x}$

f) None of the above.

Question 13

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' + 36y = 0,\ y(\pi) = 1,\ y'(\pi) = -2]$$

a) $y = e^{6x} - \frac{1}{3}xe^{6x}$

b) $y = -\frac{1}{3}e^{6x} + xe^{6x}$

c) $y = \cos(6x) - \frac{1}{3}\sin(6x)$

d) $y = \cos(6x) + \frac{1}{3}\sin(6x)$

e) $y = -\frac{1}{3}\cos(6x) + \sin(6x)$

f) None of the above.

Question 14

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' - 8y' + 17y = 0,\ y(0) = -1,\ y'(0) = -1]$$

a) $y = -3e^{4x} + 2xe^{-x}$

b) $y = e^{-x}(-\cos(4x) - 3\sin(4x))$

c) $y = -\cos(4x) - 3\sin(4x)$

d) $y = e^{4x}(-\cos(x) + 3\sin(x))$

e) $y = -3e^{4x} - xe^{-x}$

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:

$$[y_1(x) = 2\cos(3x),\ y_2(x) = 3\sin(3x)]$$

a) $y'' - 9y = 0$

b) $y'' - 6y' + 9y = 0$

c) $y'' + 6y' + 9y = 0$

d) $y'' + 9y' = 0$

e) $y'' + 9y = 0$

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.

$$y = C_1 e^{4x} + C_2 e^{-3x}$$

a) $y'' - y' - 12y = 0$

b) $y'' + 6y' + 25y = 0$

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

d) $y'' + y' - 12y = 0$

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

f) None of the above.

Question 17

Your answer is CORRECT.

Find the general solution of

$$xy' - 4y = 3x$$

a) $y = -x + Cx^4$

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

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

d) $y = -\frac{3}{4}x^3 + Cx^4$

e) $y = -x^3 + Cx^4$

f) None of the above.

Question 18

Your answer is CORRECT.

Give the general solution to

$$x^2y' + 2xy = \cos(4x)$$

a) $y=\frac{1}{4}\frac{\sin(4x)}{x^2}+Cx^2$

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

c) $y=\frac{1}{4}\sin(4x)\,x^2+Cx^2$

d) $y=-\frac{1}{4}\sin(2x)\,x^2+Cx^2$

e) $y=\frac{1}{4}\frac{\sin(4x)}{x^2}+\frac{C}{x^2}$

f) None of the above.

Question 19

Your answer is CORRECT.

Give the general solution to

$$y'=\frac{5x^3+y^3}{xy^2}$$

a) $y^3=15x^3\ln(x)+x^3C$

b) $y=-\frac{1}{4}x^3C+x^{15}$

c) $y=15x^3\ln(x)+x^3C$

d) $y=-\frac{1}{4}x^3+Cx^{15}$

e) $y^3=15Cx^3\ln(x)+x^3$

f) None of the above.

Question 20

Your answer is CORRECT.

Give the general solution to

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

a) $y = \frac{1}{7}x^3 + \frac{C}{x^3}$

b) $y^4 = \frac{1}{6}x^4 + \frac{C}{x^3}$

c) $\frac{1}{y^3} = \frac{1}{6}x^3 + \frac{C}{x^3}$

d) $y = \frac{1}{7}x^4 + \frac{C}{x^3}$

e) $\frac{1}{y^3} = \frac{1}{7}x^4 + \frac{C}{x^3}$

f) None of the above.