

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

$$y'' - y' - 20y = 0$$

Identify a fundamental set of solutions for this differential equation.

a) $\{e^{-5x}, e^{-4x}\}$

b) $\{e^{-4x}, e^{5x}\}$

c) $\{e^{4x}, e^{5x}\}$

d) $\{e^{-5x}, e^{4x}\}$

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

f) None of the above.

Question 2

Your answer is CORRECT.

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

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

Give the solution to the initial value problem

$$\left[x^2 y'' - 2y = 0 \quad y(1) = 0 \quad y'(1) = 3 \right]$$

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

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

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

- d) $y = \frac{1}{3x} + x^2$
- e) $y = -\frac{1}{x} + x^2$
- f) None of the above.

Question 3

Your answer is CORRECT.

Given the differential equation

$$y'' - \left(\frac{3}{x}\right)y' - \left(\frac{5}{x^2}\right)y = 0$$

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

- a) $r = \{-1, 5\}$
- b) $r = \left\{-\frac{3}{2}, 2 + \frac{1}{2}\sqrt{29}\right\}$
- c) $r = \left\{2 - \frac{1}{2}\sqrt{29}, 2 + \frac{1}{2}\sqrt{29}\right\}$
- d) $r = \left\{\frac{3}{2} - \frac{1}{2}\sqrt{29}, \frac{3}{2} + \frac{1}{2}\sqrt{29}\right\}$
- e) $r = \left\{2 - \frac{1}{2}\sqrt{26}, 2 + \frac{1}{2}\sqrt{26}\right\}$
- f) None of the above.

Question 4

Your answer is CORRECT.

Show that $y_1(x) = e^{6x}$ and $y_2(x) = e^{-7x}$ are linearly independent on $I = (-\infty, \infty)$ and find a second order homogeneous equation having the pair as a fundamental set of solutions.

- a) $y'' + y' - 42y = 0$
- b) $y'' - y' - 42y = 0$
- c) $y'' + 6y' - 7y = 0$
- d) $y'' - 14y' + 7y = 0$
- e) $y'' - y' + 42y = 0$

f) None of the above.

Question 5

Your answer is CORRECT.

Give the general solution to

$$y'' + 10y' + 26y = 0$$

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

b) $y = C_1 e^x + C_2 e^x$

c) $y = e^{-5x} (C_1 \cos(x) + C_2 \sin(x))$

d) $y = e^x (C_1 \cos(5x) - C_2 \sin(5x))$

e) $y = C_1 \cos(5x) - C_2 \sin(5x)$

f) None of the above.

Question 6

Your answer is CORRECT.

Give the general solution to

$$y'' + 3y' - 10y = 0$$

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

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

f) None of the above.

Question 7

Your answer is INCORRECT.

Give the general solution to

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

- a) $y = C_1 e^{-2x} + C_2$
- b) $y = C_1 e^{2x} + C_2 x e^{2x}$
- c) $y = C_1 e^{2x} + C_2 x e^{-2x}$
- d) $y = C_1 e^{-2x} + C_2 x e^{-2x}$
- e) $y = C_1 e^{2x} + C_2 e^{-2x}$
- f) None of the above.

Question 8

Your answer is CORRECT.

The function

$$-5x e^{-2x}$$

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

- a) $y'' + 4y' + 4y = 0$
- b) $y'' + 10y' + 25y = 0$
- c) $y'' + 7y' + 10y = 0$
- d) $y'' - 4y' + 4y = 0$
- e) $y'' - 10y' + 25y = 0$
- f) None of the above.

Question 9

Your answer is CORRECT.

The function

$$5e^{-3x} \cos(2x)$$

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

- a) $y'' + 6y' + 4y = 0$
- b) $y'' + 4y' + 34y = 0$
- c) $y'' + 5y' + 6y = 0$
- d) $y'' - 6y' + 4y = 0$
- e) $y'' - 6y' - 4y = 0$
- f) None of the above.

Question 10

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' - 6y' + 8y = 0, y(0) = 2, y'(0) = 1]$$

- a) $y = \frac{7}{2} e^{4x} + \frac{3}{2} e^{2x}$
- b) $y = -\frac{3}{2} e^{4x} - \frac{7}{2} e^{2x}$
- c) $y = \frac{3}{2} e^{4x} - \frac{7}{2} e^{2x}$
- d) $y = -\frac{3}{2} e^{4x} + \frac{7}{2} e^{2x}$
- e) $y = \frac{7}{2} e^{4x} - \frac{3}{2} e^{2x}$
- f) None of the above.

Question 11

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' - 3y' - 18y = 0, y(0) = 1, y'(0) = -2]$$

- a) $y = \frac{1}{9} e^{6x} + \frac{8}{9} e^{-3x}$
- b) $y = \frac{8}{9} e^{6x} + \frac{1}{9} e^{-3x}$

- c) $y = \frac{1}{9} e^{6x} - \frac{8}{9} e^{-3x}$
- d) $y = -\frac{1}{9} e^{6x} - \frac{8}{9} e^{-3x}$
- e) $y = \frac{8}{9} e^{6x} - \frac{1}{9} e^{-3x}$
- f) None of the above.

Question 12

Your answer is **CORRECT**.

Find the solution of the initial value problem:

$$[y'' - 12y' + 36y = 0, \quad y(0) = -2, \quad y'(0) = 3]$$

- a) $y = 4e^{6x} - 15xe^{6x}$
- b) $y = 15e^{6x} - 2xe^{6x}$
- c) $y = -2e^{6x} - 30xe^{6x}$
- d) $y = 15e^{6x} + 4xe^{6x}$
- e) $y = -2e^{6x} + 15xe^{6x}$
- f) None of the above.

Question 13

Your answer is **INCORRECT**.

Find the solution of the initial value problem:

$$[y'' + 9y = 0, \quad y(\pi) = 3, \quad y'(\pi) = -2]$$

- a) $y = -3e^{3x} + \frac{2}{3}xe^{3x}$
- b) $y = \frac{2}{3}e^{3x} - 3xe^{3x}$
- c) $y = -3\cos(3x) + \frac{2}{3}\sin(3x)$

- d) $y = -3 \cos(3x) - \frac{2}{3} \sin(3x)$
- e) $y = \frac{2}{3} \cos(3x) - 3 \sin(3x)$
- f) None of the above.

Question 14

Your answer is CORRECT.

Find the solution of the initial value problem:

$$[y'' + 4y' + 5y = 0, y(0) = -1, y'(0) = -3]$$

- a) $y = e^x (-\cos(2x) + 5 \sin(2x))$
- b) $y = -5 e^{-2x} - x e^x$
- c) $y = e^{-2x} (-\cos(x) - 5 \sin(x))$
- d) $y = -\cos(2x) + 5 \sin(2x)$
- e) $y = -5 e^{-2x} + 2x e^x$
- 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.

$$y = C_1 e^{6x} + C_2 e^{-7x}$$

- a) $y'' + 14y' + 85y = 0$
- b) $y'' + y' - 42y = 0$
- c) $y'' + 12y' + 36y = 0$
- d) $y'' - y' - 42y = 0$
- e) $y'' + 36y' = 0$
- f) None of the above.

Question 17**Your answer is CORRECT.**

Give the general solution of

$$xy' + 2y = \frac{3e^{-4x}}{x}$$

- a) $y = -\frac{3}{4} \frac{e^{-4x}}{x^2} + \frac{C}{x^2}$
- b) $y = -\frac{3}{4} e^{-4x} + C$
- c) $y = -\frac{3}{4} x^2 e^{-4x} + Cx^2$
- d) $y = \frac{3e^{-4x}}{x^2} + \frac{C}{x^2}$
- e) $y = -\frac{3}{4} \frac{e^{-4x}}{x} + \frac{C}{x}$
- f) None of the above.

Question 18

Your answer is **CORRECT**.

Give the general solution of

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

- a) $y^2 = C(x - 3) - 3$
- b) $\ln(y^2 + 3) = x^2 - 6x + C$
- c) $y^2 + 3 = C e^{x-3}$
- d) $y^2 = C(x - 3)^2 - 3$
- e) $y^2 + 3 = (x - 3)^2 + C$
- f) None of the above.

Question 19

Your answer is **INCORRECT**.

Give the general solution to

$$\frac{dy}{dx} = \frac{6x \sec\left(\frac{y}{x}\right) + y}{x}$$

- a) $\sec\left(\frac{y}{x}\right) + 6 \ln(x) = C$
- b) $\sin\left(\frac{y}{x}\right) + 6 \ln(x) = C$
- c) $\sec\left(\frac{y}{x}\right) \tan\left(\frac{y}{x}\right) - 6 \ln(x) = C$
- d) $\sin\left(\frac{y}{x}\right) - \frac{6}{x^2} = C$
- e) $\sin\left(\frac{y}{x}\right) - 6 \ln(x) = C$
- f) None of the above.

Question 20

Your answer is **CORRECT**.

Give the general solution to

$$-3y' + \frac{2y}{x} = \frac{y^4}{x^4}$$

- a) $\frac{1}{y^3} = -\frac{1}{2x^4} + \frac{C}{x^2}$
- b) $y^4 = -\frac{1}{2x^3} + \frac{C}{x^2}$
- c) $\frac{1}{y^3} = -\frac{1}{x^3} + \frac{C}{x^2}$
- d) $y = -\frac{1}{x^4} + \frac{C}{x^2}$
- e) $y = -\frac{1}{x^3} + \frac{C}{x^2}$
- f) None of the above.