1.(1 pt) Find y as a function of t if

$$64y'' - 9y = 0,$$

$y(0) = 3, \quad y'(0) = 8.$

$y(t) =$ _____

2.(1 pt) Find y as a function of t if

$$25y'' - 729y = 0$$

with $y(0) = 4, \quad y'(0) = 1.$

$y =$ _____

3.(1 pt) Find y as a function of t if

$y'' + 81y = 0, \quad y(0) = 1, \quad y'(0) = 7.$

$y =$ _____

4.(1 pt) Find y as a function of t if

$$y'' + 2y' - 15y = 0$$

$y(0) = 4, \quad y(1) = 3.$

$y(t) =$ _____

Remark: The initial conditions involve values at two points.

5.(1 pt) Find y as a function of t if

$9y'' + 24y' + 16y = 0, \quad y(0) = 7, \quad y'(0) = 1.$

$y =$ _____

6.(1 pt) Find y as a function of t if

$$5y'' + 26y = 0$$

$y(0) = 2, \quad y'(0) = 2.$

$y(t) =$ _____

Note: This particular weBWorK problem can't handle complex numbers, so write your answer in terms of sines and cosines, rather than using e to a complex power.

7.(1 pt) Find y as a function of t if

$$64y'' + 48y' + 11y = 0$$

$y(0) = 6, \quad y'(0) = 8.$

$y =$ _____

Note: This problem cannot interpret complex numbers. You may need to simplify your answer before submitting it.

8.(1 pt) Find y as a function of t if

$$40y'' + 15y' + 14y = 0$$

$y(0) = 8, \quad y'(0) = 7.$

$y(t) =$ _____

Note: This problem cannot interpret complex numbers. You may need to simplify your answer before submitting it.

9.(1 pt) Find y as a function of t if

$y'' + 10y' + 106y = 0, \quad y(0) = 9, \quad y'(0) = 7.$

$y =$ _____

Note: This problem cannot interpret complex numbers. You may need to simplify your answer before submitting it.

10.(1 pt) Find y as a function of t if

$49y'' + 112y' + 80y = 0, \quad y(0) = 9, \quad y'(0) = 1.$

$y =$ _____

Note: This problem cannot interpret complex numbers. You may need to simplify your answer before submitting it.

11.(1 pt) Find the function y_1 of t which is the solution of $9y'' + 12y' = 0$
with initial conditions $y_1(0) = 1, \quad y_1'(0) = 0.$

$y_1 =$ _____

Find the function y_2 of t which is the solution of $9y'' + 12y' = 0$
with initial conditions $y_2(0) = 0, \quad y_2'(0) = 1.$

$y_2 =$ _____

Find the Wronskian $W(t) = W(y_1, y_2)$.

$W(t) =$ _____

Remark: You can find W by direct computation and use Abel's theorem as a check. You should find that W is not zero and so y_1 and $y_2$form a fundamental set of solutions of $9y'' + 12y' = 0$.

12.(1 pt) Find y as a function of t if

$1296y'' + 72y' + y = 0, \quad y(0) = 8, \quad y'(0) = 9.$

$y =$ _____

13.(1 pt) Find y as a function of t if

$64y'' + 96y' + 36y = 0, \quad y(5) = 9, \quad y'(5) = 4.$

$y =$ _____

14.(1 pt) Determine whether the following pairs of functions are linearly independent or not.

? 1. $f(t) = t$ and $g(t) = |t|$

? 2. $f(t) = t^2 + 18t$ and $g(t) = t^2 - 18t$

? 3. The Wronskian of two functions is $W(t) = t$ are the functions linearly independent or dependent?

15.(1 pt)

Suppose that the Wronskian of two functions $f_1(t)$ and $f_2(t)$ is given by

$$W(t) = t^2 - 4 = \det \begin{pmatrix} f_1(t) & f_2(t) \\ f_1'(t) & f_2'(t) \end{pmatrix}$$

Even though you don't know the functions f_1 and f_2 you can determine whether the following questions are true or false.

? 1. The vectors $(f_1(0), f_1'(0))$ and $(f_2(0), f_2'(0))$ are linearly independent

? 2. The equations

$$\begin{aligned} af_1(2) + bf_2(2) &= c \\ af_1'(2) + bf_2'(2) &= d \end{aligned}$$

have a unique solution for any c and d

? 3. The vectors $(f_1(-2), f_1'(-2))$ and $(f_2(-2), f_2'(-2))$ are linearly independent

? 4. The functions f_1 and f_2 are linearly independent.

? 5. The vectors $(f_1(4), f_1'(4))$ and $(f_2(4), f_2'(4))$ are linearly independent

16.(1 pt)

Determine which of the following pairs of functions are linearly independent.

? 1. $f(t) = e^{\lambda t}\cos(\mu t)$, $g(t) = e^{\lambda t}\sin(\mu t)$, $\mu \neq 0$

? 2. $f(\theta) = cos(3\theta)$, $g(\theta) = 5\cos^3(\theta) - 10\cos(\theta)$

? 3. $f(\theta) = cos(3\theta)$, $g(\theta) = 5\cos^3(\theta) - 5\cos(\theta)$

? 4. $f(x) = e^{5x}$, $g(x) = e^{5(x-3)}$

17.(1 pt)

Match the second order linear equations with the Wronskian of (one of) their fundamental solution sets.

__ 1. $y'' - 5y' + 3y = 0$

__ 2. $y'' - \ln(t)y' + 3y = 0$

__ 3. $y'' + \frac{2}{t}y' + 3y = 0$

__ 4. $y'' - \frac{1}{t}y' + 3y = 0, \quad t > 0$

__ 5. $y'' + 5y' + 3y = 0$

A. $W(t) = 7t$

B. $W(t) = e^{t\ln(t)-t}$

C. $W(t) = \frac{5}{t^2}$

D. $W(t) = 2e^{-5t}$

E. $W(t) = e^{5t}$

18.(1 pt) Find y as a function of x if

$$x^2y'' + 2xy' - 72y = 0,$$

$y(1) = 2,\ y'(1) = -6.$

$y =$ _____

19.(1 pt) Find y as a function of x if

$$x^2y'' - 11xy' + 36y = 0,$$

$y(1) = 0,\ y'(1) = 3.$

$y =$ _____