

1) Let $A = \begin{bmatrix} 3 & -2 \\ 1 & 0 \end{bmatrix}$. Then the **eigenvalues** of A are 1) _____

- A) 1
- B) 1, 2
- C) 2
- D) - 1, - 2
- E) 0, 1, - 2

2) Let $A = \begin{bmatrix} 10 & -18 \\ 6 & -11 \end{bmatrix}$. Then the **eigenvalues** of A are 2) _____

- A) 1, - 1, - 2
- B) - 1, - 2, 0
- C) - 1, 2
- D) 0, 1, 2
- E) 1, - 2

3) We are given the following system : $\begin{cases} y_1' = 2y_1 - y_2 \\ y_2' = -4y_1 + 2y_2 \end{cases}$ 3) _____

When you rewrite the system in the form $Y' = AY$, the eigenvalues of A are

- A) 0, 4
- B) 0, 4, - 4
- C) 2, - 2, 1
- D) 1, - 1
- E) 0, - 1

4) $L(t^3 e^{2t})$ is

4) _____

A) $\frac{6}{(s+2)^3}$

B) $\frac{1}{(s-2)^3}$

C) $\frac{6}{(s-2)^3}$

D) $\frac{6}{(s-2)^4}$

E) $\frac{6}{(s+2)^4}$

5) $L((a-bt)^2)$, where a, b are constants, is :

5) _____

A) $\frac{2(as-b)}{s^3}$

B) $\frac{s^2 a^2 - 6ab + 2b^2}{s^3}$

C) $\frac{s^2 a^2 - 2sab + 4b^2}{s^3}$

D) $\frac{2(as-b)}{s^2}$

E) $\frac{s^2 a^2 - 2sab + 2b^2}{s^3}$

6) $L\left(\frac{1}{2} t^2 e^{-3t}\right)$ is :

6) _____

A) $\frac{1}{(s-3)^4}$

B) $\frac{1}{2(s+3)^3}$

C) $\frac{1}{(s+3)^3}$

D) $\frac{1}{(s+3)^2}$

E) $\frac{1}{2(s-3)^3}$

7) $L\left((\cos 3t)^2\right)$ is :

7) _____

Hint : Use the fact that $(\cos at)^2 = \frac{1}{2} (1 + \cos (2at))$

A) $\frac{1}{s} + \frac{s}{2(s^2 + 36)}$

B) $\frac{1}{2s} + \frac{s}{2(s^2 + 36)}$

C) $\left(\frac{s}{s^2 + 9}\right)^2$

D) $\frac{1}{2s} - \frac{s}{(s^2 + 36)}$

E) $\frac{1}{s} - \frac{s}{(s^2 + 36)}$

8) $L(3) + L(3^2) + L(3^3)$ is :

8) _____

A) $\frac{39}{s}$

B) $\frac{36}{s}$

C) $\frac{1}{s} + \left(\frac{1}{s}\right)^2 + \left(\frac{1}{s}\right)^3$

D) $\frac{3}{s} + \left(\frac{3}{s}\right)^2 + \left(\frac{3}{s}\right)^3$

E) $\frac{s}{3} + \left(\frac{s}{3}\right)^2 + \left(\frac{s}{3}\right)^3$

You must show all the steps to receive full credit. Only the methods seen in the class are accepted.

Calculate $L(t e^t \sin t)$ (2pts)

You must show all the steps to receive full credit. Only the methods seen in the class are accepted.

Solve the following system (3pts)

$$\begin{cases} y_1' = 2y_1 - y_2 \\ y_2' = 3y_1 - 2y_2 \end{cases}$$

You must show all the steps to receive full credit. Only the methods seen in the class are accepted.

Solve the following system (3pts)

$$\begin{cases} y_1' = y_1 + 2y_2 + 2e^{4t} \\ y_2' = 2y_1 + y_2 + e^{4t} \end{cases}$$

You must show all the steps to receive full credit. Only the methods seen in the class are accepted.

Bonus: 2pts

Calculate $L(t^3 \sin t)$ (2pts)