# 1. Entregas

Debe resolverse el apartado que corresponda de los 4 ejercicios propuestos. La fecha límite de entrega será el viernes 10 de diciembre.

1. Atopa as solucións xerais das seguintes ecuacións diferenciais, así como as solucións que verifican os datos iniciais dados

   1) $x' = -2x^2t,\ \ (1,-1)$
   2) $xx' = e^{t+2x}\operatorname{sen} t,\ \ (0,1)$
   3) $(1+t^3)x' = t^2x,\ \ (0,2)$
   4) $xx' = t,\ \ (\sqrt{2},1)$
   5) $e^{2t}x' - x^2 - 2x - 1 = 0,\ \ (0,0)$
   6) $t^2x' = x - tx,\ \ (-1,-1)$
   7) $e^tx' = e^{-x} + e^{-2t-x},\ \ (0,1)$
   8) $x' = 1 + t + x + tx,\ \ x(0) = 0$
   9) $x'\cos t + x\operatorname{sen} t = \cos^2 t\ln t,\ \ x(1) = 0$
   10) $x'\cos^2 t\operatorname{sen} t + x\cos^3 t = 1,\ \ x(\frac{\pi}{4}) = 0$
   11) $tx' - 4x + 2t^2 + 4 = 0,\ \ x(1) = 1$
   12) $\operatorname{sen} tx' + x\cos t = t\operatorname{sen} t,\ \ x(\frac{\pi}{2}) = 2$
   13) $x' - \frac{x}{t} = t^2\operatorname{sen} 2t,\ \ x(\pi) = \frac{\pi}{2}$
   14) $(t+1)x' + x = \ln t,\ \ x(1) = 10$
   15) $tx' + x = e^t,\ \ x(1) = 2$
   16) $tx' + 2x = \operatorname{sen} t,\ \ x(\frac{\pi}{2}) = 0$
   17) $6t^3x' - 2t^2x = 4t - 6,\ \ x(1) = 1$
   18) $2t^2x' - 4tx = 7t^4,\ \ x(1) = 1$
   19) $x' - \frac{2}{t}x + \frac{2}{t^2} = 0,\ \ x(1) = 1$
   20) $x' + 2x = t^2,\ \ x(0) = 0$
   21) $x' - \frac{x}{t}x = t,\ \ x(1) = 0$
   22) $x' - \frac{t}{t^2-1}x = t,\ \ x(\sqrt{2}) = 0$
   23) $x' - x = \operatorname{sen} t,\ \ x(0) = 0$
   24) $x'\cos t + x\operatorname{sen} t = \operatorname{sen} t\cos t + t,\ \ x(0) = 0$
   25) $x'\cos t - x\operatorname{sen} t = \operatorname{sen} t + e^t,\ \ x(0) = 0$

2. Resolve as ecuacións diferenciais,

   1) $x'' - x = 3e^t,\ x(0) = 0,\ x'(0) = 1$
   2) $x'' - 3x' + 2x = 4t^2,\ x(0) = 0,\ x'(0) = 1$
   3) $x'' - x = 2\operatorname{sen} t,\ x(0) = 0,\ x'(0) = 1$
   4) $x'' + 4x = 4t + 1, x(\frac{\pi}{2}) = 0,\ x'(\frac{\pi}{2}) = 0$
   5) $x'' + 2x' + x = t^2,\ x(0) = 0,\ x'(0) = 1$
   6) $x'' + 4x' + 5x = 35e^{-4t},\ x(0) = -3,\ x'(0) = 1$
   7) $x'' + 2x' + x = 2\operatorname{sen} t,\ x(0) = 0,\ x'(0) = 1$
   8) $x'' = x + t,\ x(0) = 1,\ x'(0) = 0$
   9) $x'' - 3x' + 2x = -12e^{-t},\ x(0) = 1,\ x'(0) = 0$
   10) $x'' - 3x' - 4x = -6e^t,\ x(0) = 4,\ x'(0) = 8$
   11) $x'' - 6x' + 8x = -12e^t,\ x(0) = 1,\ x'(0) = 6$
   12) $x'' - 3x' + 2x = 2e^{-3t} - 4,\ x(0) = 1,\ x'(0) = 4$
   13) $x'' = x - 4\operatorname{sen} t,\ x(0) = 0,\ x'(0) = 2$
   14) $x'' - (a+b)x' = 0,\ x(0) = a,\ x'(0) = a(a+b)$
   15) $x'' - 9x' + 20x = 20 + 12e^t,\ x(0) = 0,\ x'(0) = 1$
   16) $x'' - 5x' - 14x = 10e^{-3t},\ x(0) = 1,\ x'(0) = 6$
   17) $x'' + 7x' + 10x = 130\cos t,\ x(0) = 0,\ x'(0) = 25$
   18) $x'' - 9x' + 8x = 18e^{-t} + 64t,\ x(0) = 4,\ x'(0) = 1$
   19) $x'' - 11x' + 30x = 56e^{-2t} + 30,\ x(0) = 4,\ x'(0) = 1$
   20) $x'' - 9x = 10\cos t,\ x(0) = 1,\ x'(0) = 0$
   21) $x'' - 25x = 9e^{-4t},\ x(0) = 0,\ x'(0) = -1$
   22) $x'' + 7x' + 10x = 50t^2 + 20t,\ x(0) = 1,\ x'(0) = 1$
   23) $x'' - 5x' - 14x = 98t^2,\ x(0) = 1,\ x'(0) = 0$
   24) $x'' - 3x' + 2x = 4t^2 + 4t + 4,\ x(0) = 1,\ x'(0) = 1$
   25) $x'' - 6x' + 8x = 64t^2 + 64,\ x(0) = 1,\ x'(0) = 0$

3. Resolve o sistema cas condicións iniciais que se indican,

1) $\left.\begin{array}{l} x' = x - 5y - e^{-t} \\ y' = 2y + 3e^{-t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 0 \end{array}$

2) $\left.\begin{array}{l} x' = x + 2y + 2e^{t} \\ y' = 3x + 2y - 2e^{t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 4 \\ y(0) = 1 \end{array}$

3) $\left.\begin{array}{l} x' = y \\ y' = x + t \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 0 \end{array}$

4) $\left.\begin{array}{l} x' = x - 2\,\mathrm{sen}\, t \\ y' = 2x - y \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 0 \end{array}$

5) $\left.\begin{array}{l} x' = a(x + y) \\ y' = b(x + y) \end{array}\right\}$, con $\begin{array}{l} x(0) = a \\ y(0) = b \end{array}$

6) $\left.\begin{array}{l} x' = 3x - y + 4e^{t} \\ y' = -x + 3y + 4e^{t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 1 \end{array}$

7) $\left.\begin{array}{l} x' = 2y + 2 \\ y' = -x + 3y + e^{-3t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 1 \end{array}$

8) $\left.\begin{array}{l} x' = y \\ y' = x + 3e^{t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 1 \end{array}$

9) $\left.\begin{array}{l} x' = y \\ y' = 2x + 3y + 4t^{2} \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 1 \end{array}$

10) $\left.\begin{array}{l} x' = y \\ y' = x + 2\,\mathrm{sen}(t) \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 1 \end{array}$

11) $\left.\begin{array}{l} x' = y \\ y' = -x - 2y + t^{2} \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 1 \end{array}$

12) $\left.\begin{array}{l} x' = y \\ y' = -x - 2y + 2\,\mathrm{sen}(t) \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 1 \end{array}$

13) $\left.\begin{array}{l} x' = y \\ y' = -y + 3t^{2} - t \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 7 \end{array}$

14) $\left.\begin{array}{l} x' = y \\ y' = -x - 2y + 4e^{t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 1 \end{array}$

15) $\left.\begin{array}{l} x' = y \\ y' = 9y - 20x + 20 + 12e^{t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 1 \end{array}$

16) $\left.\begin{array}{l} x' = y \\ y' = 14x + 5y + 10e^{-3t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 6 \end{array}$

17) $\left.\begin{array}{l} x' = y \\ y' = -10x - 7y + 130\cos t \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = 25 \end{array}$

18) $\left.\begin{array}{l} x' = y \\ y' = -8x + 9y + 18e^{-t} + 64t \end{array}\right\}$, con $\begin{array}{l} x(0) = 4 \\ y(0) = 1 \end{array}$

19) $\left.\begin{array}{l} x' = y \\ y' = 11y - 30x + 56e^{-2t} + 30 \end{array}\right\}$, con $\begin{array}{l} x(0) = 4 \\ y(0) = 1 \end{array}$

20) $\left.\begin{array}{l} x' = y \\ y' = 9x + 10\cos t \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 0 \end{array}$

21) $\left.\begin{array}{l} x' = y \\ y' = 25x + 9e^{-4t} \end{array}\right\}$, con $\begin{array}{l} x(0) = 0 \\ y(0) = -1 \end{array}$

22) $\left.\begin{array}{l} x' = y \\ y' = -10x - 7y + 50t^{2} + 20t \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 1 \end{array}$

23) $\left.\begin{array}{l} x' = y \\ y' = 14x + 5y + 98t^{2} \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 0 \end{array}$

24) $\left.\begin{array}{l} x' = y \\ y' = 3y - 2x + 4t^{2} + 4t + 4 \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 1 \end{array}$

25) $\left.\begin{array}{l} x' = y \\ y' = 6y - 8x + 64t^{2} + 64 \end{array}\right\}$, con $\begin{array}{l} x(0) = 1 \\ y(0) = 0 \end{array}$

4. Debuxa o diagrama de fase e esboza a solución das ecuacións:

1) $x' = (x-1)(3-x)$ 2) $x' = (x+2)(2-x)$ 3) $x' = 2x(x-5)$
4) $x' = (1-x)(4-x)$ 5) $x' = x(x-3)(x+2)$ 6) $x' = (x-2)^2(5-x)$
7) $x' = x(x-1)(x+2)$ 8) $x' = -(x+1)(1-x)$ 9) $x' = -2x(x-5)^2$
10) $x' = x(x+1)(x-4)$ 11) $x' = -x^2(x+3)(x-2)$ 12) $x' = -(x-2)^2(x+3)$
13) $x' = x(x+1)(3-x)$ 14) $x' = (x+2)(2-x)$ 15) $x' = -2x^2(x+3)$
16) $x' = -(2-x)(6-x)$ 17) $x' = (x-1)(x-3)(x+2)$ 18) $x' = (x-1)^3(4-x)$
19) $x' = -x(x-2)(x+2)$ 20) $x' = -(x+3)(3-x)$ 21) $x' = -3x^3(x-3)^2$
22) $x' = (x+1)(4-x)(2-x)$ 23) $x' = x(x-2)^2(x+2)$ 24) $x' = -(x-1)^2(3-x)$
25) $x' = x^2(2-x)(4-x)$