5.1 Slope Field's and Euler's Method **WA Larson**

#1-10 [5.1] p.373-374 #13,14,19,21,25,26,37,40,48,51

In Exercises 13–18, the differential equation is $y^{(4)} - 16y = 0$.

13. $y = 3\cos x$

$y^{(4)} = 3\cos x$

$y^{(4)} - 16y = -45\cos x \neq 0,$

No

14. $y = 3\sin 2x$

$y^{(4)} = 48\sin 2x$

$y^{(4)} - 16y = 48\sin 2x - 16(3\sin 2x) = 0$

Yes

In Exercises 19–24, the differential equation is $xy' - 2y = x^3e^x$.

19. $y = x^2,\ y' = 2x$

$xy' - 2y = x(2x) - 2(x^2) = 0 \neq x^3e^x,$

No

21. $y = x^2e^x,\ y' = x^2e^x + 2xe^x = e^x(x^2 + 2x)$

$xy' - 2y = x(e^x(x^2 + 2x)) - 2(x^2e^x) = x^3e^x,$

Yes

25. $y = Ce^{-x/2}$ passes through $(0, 3)$.

$3 = Ce^0 = C \Rightarrow C = 3$

Particular solution: $y = 3e^{-x/2}$

26. $2x^2 - y^2 = C$ passes through $(3, 4)$.

$2(9) - 16 = C \Rightarrow C = 2$

Particular solution: $2x^2 - y^2 = 2$

37. $\dfrac{dy}{dx} = \dfrac{x}{1 + x^2}$

$y = \displaystyle\int \frac{x}{1 + x^2}\,dx = \frac{1}{2}\ln(1 + x^2) + C$

$(u = 1 + x^2,\ du = 2x\,dx)$

40. $\dfrac{dy}{dx} = x\cos x^2$

$y = \displaystyle\int x\cos(x^2)\,dx = \frac{1}{2}\sin(x^2) + C$

$(u = x^2,\ du = 2x\,dx)$

48.

x	-4	-2	0	2	4	8
y	2	0	4	4	6	8
dy/dx	6	2	4	2	2	0

51. $\frac{dy}{dx} = \sin 2x$

For $x = 0, \frac{dy}{dx} = 0$. Matches (b).