NAME_____Period_____Date_____

C H A P T E R 7 A T E S T : Diff. Eqs. and Mathematical Modeling
p r a c t i c e t e s t

1. $\int_2^5 \frac{2}{3x+1}dx$ 2. $\int \frac{2x}{\sqrt{x^2+1}}dx$ 3. $\int x\cos 2x dx$ 4. $\int x^2 e^{3x}dx$

5. Use the general power rule to evaluate the integral: $\int x\sqrt{4-9x^2}dx$ 6. Evaluate the integral: $\int_0^1 x\sqrt{x^2+1}dx$

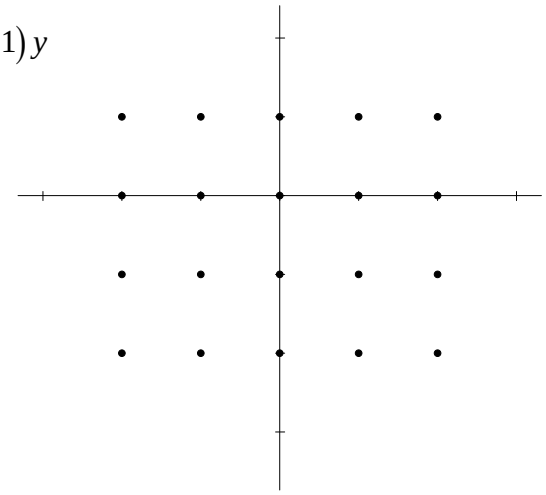
7. Find an expression in *a* and *b* for the value of the definite integral: $\int_a^b \left[5x^2+\sqrt{x-7}\right]dx$

8. Solve the differential equation: $e^{4x}y' = x$. 9. Evaluate the integral $\int \ln(x+1)\,dx$

10. Evaluate the integral $\int \cos(\ln x)\,dx$

11. (CALCULATOR) A function *y* = *f*(*x*) has the differential equation $\frac{dy}{dx} = (x+1)y$

a) Graph a slope field for the differential equation on the provided axes.
b) Describe **all** points in the *x*-*y* axis where the slope is negative.
c) Use Euler's method with Δx = -0.05 to approximate *f*(1.8) if *f*(2) = 2.
d) Solve the diff equation $\frac{dy}{dx} = \frac{2x+1}{2}$ for the initial equation *f*(0) = 4.



12. NON CALCULATOR: For $e^{-2x}\cos\left(\frac{x}{3}\right)$, find the antiderivative

13. NON CALCULATOR: For $V(t) = t^3e^{-t}$ (a) Find the antiderivative of *V*(*t*),
(b) Evaluate $\int_{t=0}^{t=4} V(t)\,dt$, (c) compute the average value of *V*(*t*) on [0, 4].

14. $\int \cot^3\frac{x}{2}\csc^2\frac{x}{2}dx$ 15. $\int x\ln x dx$ 16. $\int \frac{\sec^2 x}{\sqrt{\tan x}}dx$ 17. $\int \frac{1}{x^2e^{2/x}}dx$

18. Solve the differential equation $\frac{dy}{dx} = 2e^{2x}$ where $y = f(x)$ and $f(0) = -3$

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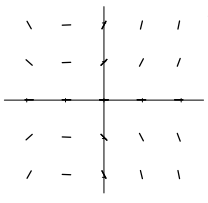
1. $\frac{2}{3}\ln\frac{16}{7}$ 2. $2\sqrt{x^2+1}+C$ 3. $\frac{1}{4}\cos 2x + \frac{1}{2}x\sin 2x + C$ 4. $\frac{e^{3x}}{27}\left(9x^2-6x+2\right)+C$

5. $-\frac{1}{27}\left(4-9x^2\right)^{3/2}C$ 6. $\frac{1}{3}\left(2^{3/2}-1\right)$ 7. $\frac{5}{3}\left(b^3-a^3\right)+\frac{2}{3}(b-7)^{3/2}-\frac{2}{3}(a-7)^{3/2}$ 8. $y = -\frac{4x+1}{16e^{4x}}+C$

9. $(x+1)\ln(x+1)-x+C$ 10. $\frac{x}{2}\left(\cos(\ln x)+\sin(\ln x)\right)+C$ 11. (b) the slope is negative when x<-1 and y>0 or when x>-1 and y<0.



(c) f(1.8) ≈1.0625 (d) $y = \frac{x^2+x+8}{2}$ 12. $\frac{3}{37e^{2x}}\left(\sin\frac{x}{3}-6\cos\frac{x}{3}\right)+C$ 13.(a) $-\frac{1}{e^t}\left(t^3+3t^2+6t+6\right)+C$

(b) $6-\frac{142}{e^4}$ (c) $\frac{3e^4-71}{2e^4}$ 14. $-\frac{1}{2}\cot^4\frac{x}{2}+C$ 15. $\frac{1}{4}x^2\left[2\ln x-1\right]+C$

16. $2\sqrt{\tan x}+C$ 17. $\frac{1}{2e^{2/x}}+C$ 18. $y = e^{2x}-4$