

Name _____ Period _____ Date _____

NON-CALCULATOR SECTION

Vocabulary: **Directions** – Define each word *and* give an example.

1. Variable of Integration
2. Exponential Decay Function

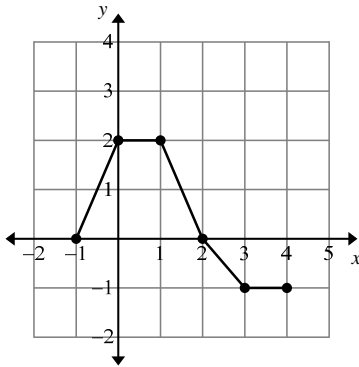
Short Answer

3. Write Newton's Law of Cooling and describe what each variable represents.
4. Describe how a slope field illustrates the family of curves resulting from a differential equation.

Review

5. The graph of a piecewise linear function, f , for $-1 \leq x \leq 4$, is shown below. What is the value of

$$\int_{-1}^4 f(x) dx ?$$



6. Evaluate the limit: $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$

Unit Seven Problems

Directions: Show all work completed to obtain your final answers. Partial credit may be given for incorrect answers. No credit may be given for problems without work if it is required to obtain the answer. Circle or box in your final answers.

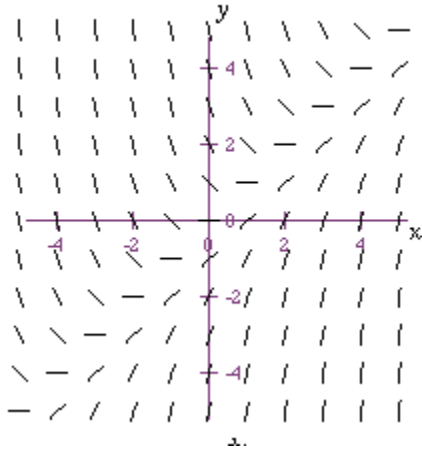
7. Evaluate $\int_1^e \left(\frac{x^2 - 1}{x} \right) dx$.

8. Evaluate $\int \frac{(\ln x)^5}{x} dx$.

9. Evaluate $\int_0^{\pi/4} \tan x \, dx$.

10. Solve the differential equation $\frac{dy}{dt} = \frac{1+t^2}{y}$.

11. Draw a possible graph for the function f with the given slope field that satisfies the initial condition $y(0) = 3$.



Multiple Choice Question: Circle the best answer.

12. If f is a linear function and $0 < a < b$, then $\int_a^b f''(x) dx =$

- (A) 0
 (B) 1
 (C) $\frac{ab}{2}$
 (D) $b - a$
 (E) $\frac{b^2 - a^2}{2}$

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CALCULATOR SECTION

Directions: Show all work completed to obtain your final answers. Partial credit may be given for incorrect answers. No credit may be given for problems without work if it is required to obtain the answer. Circle or box in your final answers.

13. The relative growth rate of the population of Brockton is 0.031 and its current population is $P(0) = 56,800$.

a) Write a differential equation for the population.

b) Find a formula for the population P in terms of t .

Multiple Choice Questions: Circle the best answer.

14. Population y grows according to the equation $\frac{dy}{dt} = ky$, where k is a constant and t is measured in years. If the population doubles every 10 years, then the value of k is

- (A) 0.069 (B) 0.200 (C) 0.301 (D) 3.322 (E) 5.000

15. Let $F(x)$ be an antiderivative of $\frac{(\ln x)^3}{x}$. If $F(1) = 0$, then $F(9) =$

- (A) 0.048 (B) 0.144 (C) 5.827 (D) 23.308 (E) 1640.250