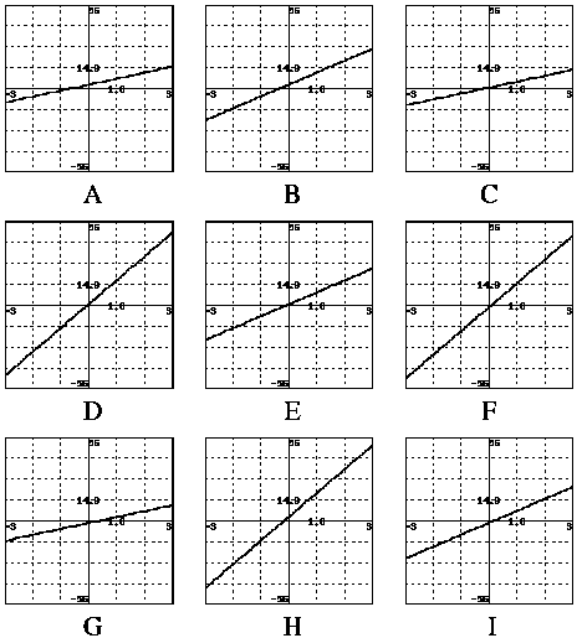
Homework 1.4 – Integrals of Constant Functions

1. **(1 pt) alfredLibrary/AUCI/chapter1/lesson4/findantiderivatives1pet.pg**
Check the box if the corresponding graph shows a function y that satisfies the condition $y' = 8$. There may be more than one correct answer.

- A. A
- B. B
- C. C
- D. D
- E. E
- F. F
- G. G
- H. H
- I. I



2. **(1 pt) alfredLibrary/AUCI/chapter1/lesson4/quiz/question3p.pg**
The indefinite integral of a constant function represents the family of antiderivatives. This is the set of all linear functions whose derivatives are the given constant function.

The definite integral of a constant function on an interval represents the net area bounded by the graph on the interval. It can be computed using the Fundamental Theorem of Calculus.

Evaluate each integral.

1. (a) $\int 4\,dx =$ _____

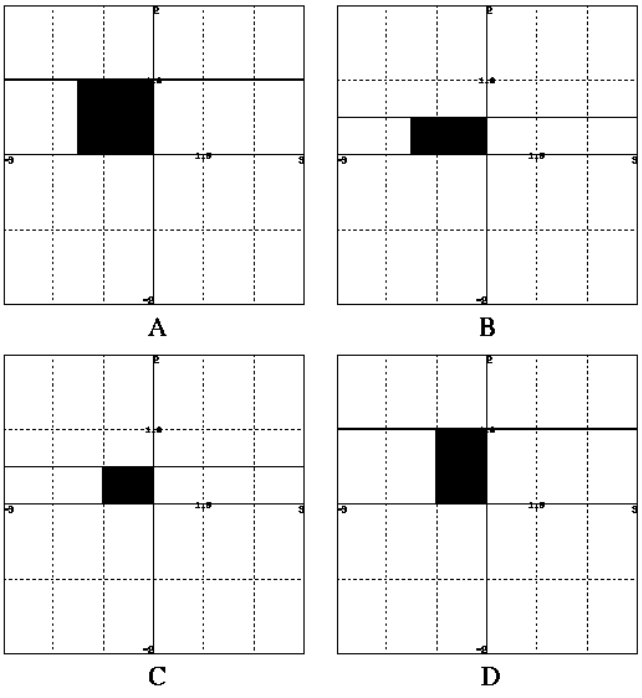
(b) $\int_{-9}^{-2} 4\,dx =$ _____

2. (a) $\int -4\,dx =$ _____

(b) $\int_{3}^{8} -4\,dx =$ _____

3. **(1 pt) alfredLibrary/AUCI/chapter1/lesson5/matcharea2.pg**
Which of the shaded regions corresponds to the expression $\int_{-1.5}^{0} 1\,dx$?

- A. A
- B. B
- C. C
- D. D



4. **(1 pt) alfredLibrary/AUCI/chapter1/lesson5/fluid2.pg**
(Include units *in each of your answers!)*

The height of water in a rectangular tank is given by $h(w)$, where w is the volume of water (in liters) that has been removed

from the tank. The height of the water decreases 20mm per liter removed.

(a) From the time when 6 L have been removed to the time when 14 L have been removed, the accumulated change in the height of the water is

$$\_\int\_\ \_\_\_\_\ \ dw = \_\_\_\_\_$$

(b) If the initial height of the water is 600mm, then the height of the water after w liters have been removed is

$h(w) =$ _____.

Therefore,

$h(6\text{ L}) =$ _____, and

$h(14\text{ L}) =$ _____.

From the time when 6 L have been removed to the time when 14 L have been removed, the net change in height of the water is

$h(14\text{ L}) - h(6\text{ L}) =$_____.

(c) Compare your final answers from parts (a) and (b). Are they the same or different? Why or why not?

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5. **(1 pt) alfredLibrary/AUCI/chapter1/lesson4/IVP2pet.pg**

The family of antiderivatives of a constant function $y' = m$ is an infinite family of linear functions $y = mx + C$. If a point in the plane is given (e.g., the initial value), then exacly one member of the family passes through that point. This member of the family is identified by a unique value for C. An *initial value problem* is a problem in which we must use a given point to find a particular C. Here are two examples:

_____ = _____

(a) If $f'(t) = 1$ then the most general formula for f is

$\int \_\_ dt =$ _____.

This answer represents a family of linear functions whose slopes are $m = 1$. Find the member of the family that passes through the point $(0,4)$. That is, if $f(0) = 4$, then

$f(t) =$ _____.

(b) If $g'(t) = 8$, then the most general formula for g is

$\int \_\_ dt =$ _____.

This answer represents a family of linear functions whose slopes are $m = 8$. Find the member of the family that passes through the point $(3,5)$. That is, if $g(3) = 5$, then

$g(t) =$ _____.