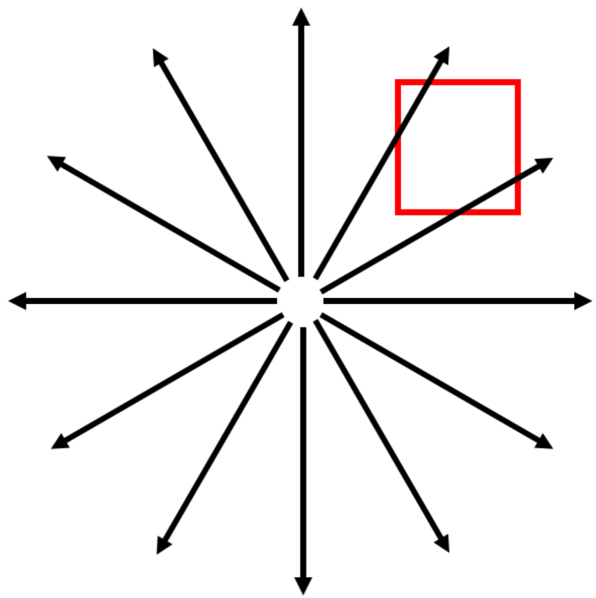
This diagram shows the field of a positive point charge. What is the divergence in the boxed region?

A. Zero

B. Not zero

C. ???



For me, the first homework was ...

A. entirely a review.
B. mostly a review, but it had a few new things in it.
C. somewhat of a review, but it had quite a few new things in it.
D. completely new for me.

I spent … hours on the first homework.

A. 1-2
B. 3-4
C. 5-6
D. 7-8
E. More than 9

Consider the 1D integral:

$$\int_a^b f(x)dx = 0$$

If the above statement is true for any choice of a and b, what can you say about $f(x)$?

A. It is zero
B. It is a non-zero constant
C. It is a linear function
D. It is sinusoidal
E. We can't say anything about it

Consider a vector field defined as the gradient of some well-behaved scalar function:

$$\mathbf{v}(x, y, z) = \nabla T(x, y, z).$$

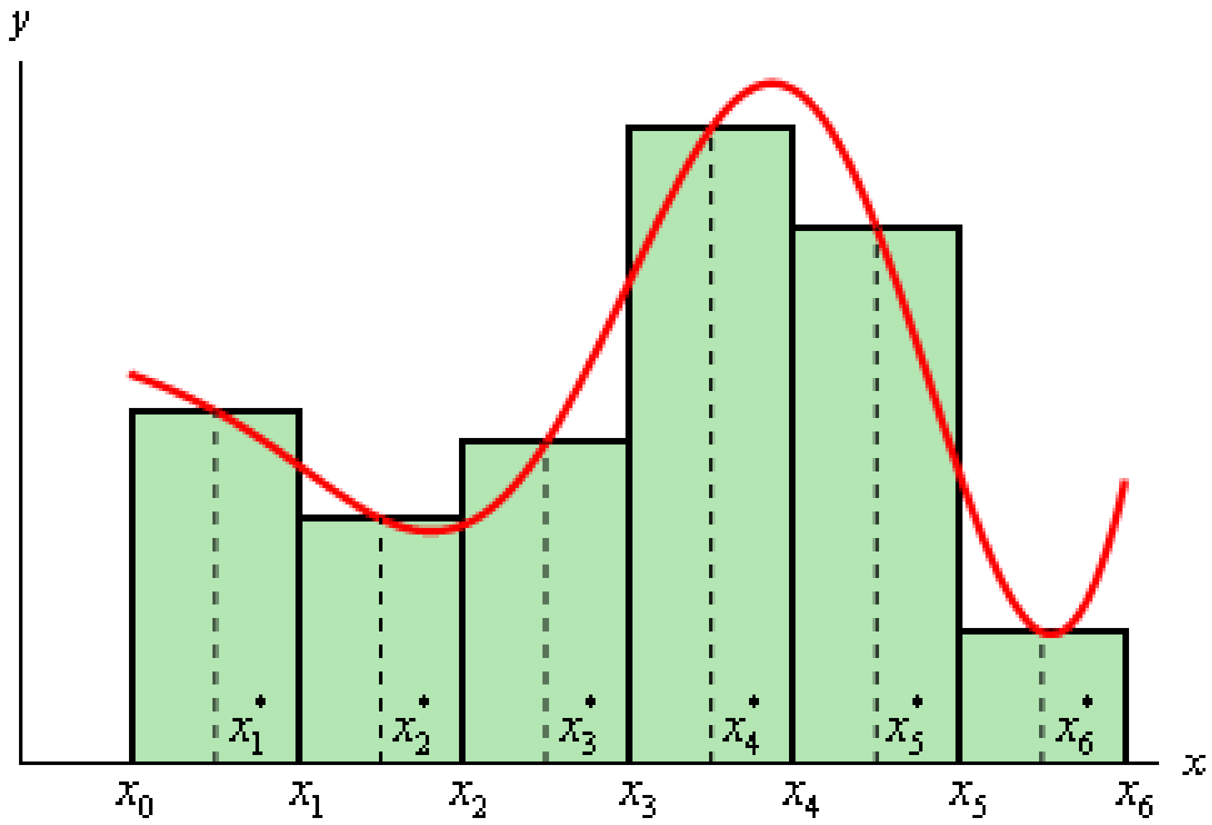
What is the value of $\oint_C \mathbf{v} \cdot d\mathbf{l}$?

A. Zero

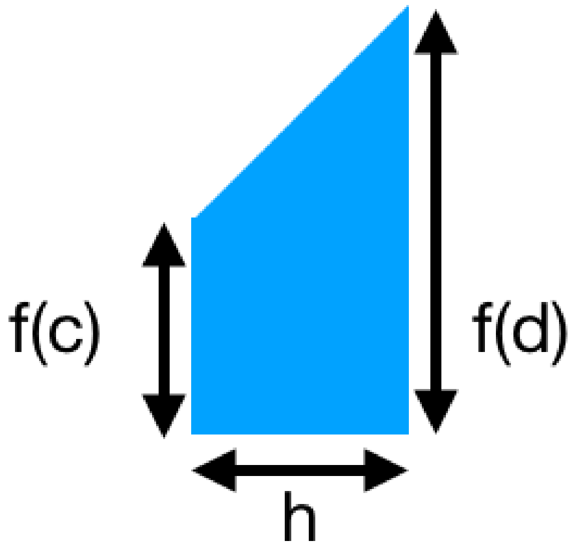
B. Non-zero, but finite

C. Can't tell without a function for T

NUMERICAL INTEGRATION



Consider this trapezoid



What is the area of this trapezoid?

A. $f(c)h$
B. $f(d)h$
C. $f(c)h + \frac{1}{2}f(d)h$
D. $\frac{1}{2}f(c)h + \frac{1}{2}f(d)h$
E. Something else

The trapezoidal rule for a function $f(x)$ gives the area of the kth slice of width h to be,

$$A_k = \frac{1}{2}h\left(f(a+(k-1)h) + f(a+kh)\right)$$

What is the approximate integral, $I(a,b) = \int_a^b f(x)dx$,

$I(a,b) \approx$

A. $\sum_{k=1}^{N} \frac{1}{2}h\left(f(a+(k-1)h) + f(a+kh)\right)$

B. $h\left(\frac{1}{2}f(a) + \frac{1}{2}f(b) + \frac{1}{2}\sum_{k=1}^{N-1} f(a+kh)\right)$

C. $h\left(\frac{1}{2}f(a) + \frac{1}{2}f(b) + \sum_{k=1}^{N-1} f(a+kh)\right)$

D. None of these is correct.

E. More than one is correct.

The trapezoidal rule takes into account the value and slope of the function. The next "best" approximation will also take into account:

A. Concavity of the function
B. Curvature of the function
C. Unequally spaced intervals
D. More than one of these
E. Something else entirely