S6.1 – New Technology – Antiderivatives

Assaf Bar-Natan (Replacing Josh Lackman)

" They took the credit for your second symphony
Rewritten by machine on new technology
And now I understand the problems you can see
Oh, ah, oh! "

–" Video Killed the Radio Star ", The Buggles

Jan. 16, 2020

The Definition of an Antiderivative

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For example: if $f(x) = 2x$ and $F(x) = x^2$, then $F(x)$ is an antiderivative of $f(x)$.

Submissions Closed

If $F(x)$ and $G(x)$ are antiderivatives of a function $f(x)$, then $H(x) = F(x)+G(x)$ is also an antiderivative of $f(x)$

A True, and I am confident in my answer.

B True, and I am not confident in my answer.

C False, and I am not confident in my answer.

D False, and I am confident in my answer.

0/9 answered

Open | Closed | Responses | Correct | 100%

Takeaway

MAT136 tip: When you know the definition, use it instead of taking shortcuts.

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  2. Positive at 0 and negative at 2
  3. Equal to a positive constant between 4 and 5.

  Make sure your axes are labelled!

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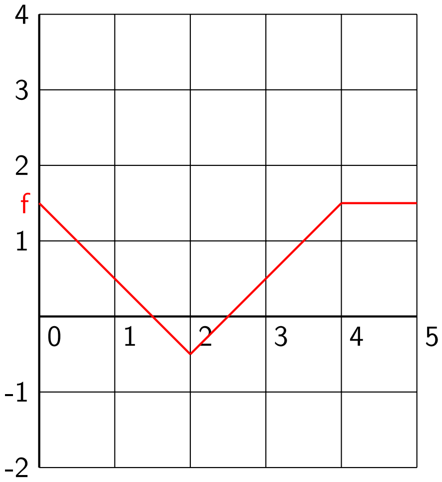
- Pass the papers back to your partner, and compare your answers. Explain what you drew.
- With your partner, pick a drawing, and draw on it an antiderivative of the original function that is different from the one you already drew

Draw The Antiderivative – My Drawing



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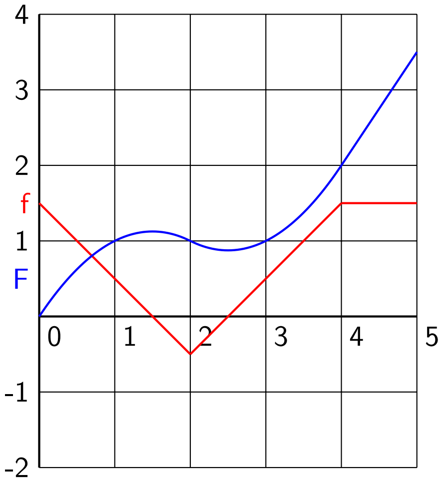

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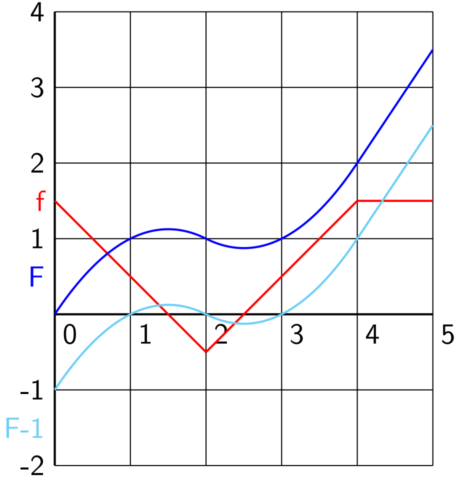

Takeaway

If F is an antiderivative of f, then $F + c$ is an antiderivative of f for any constant c

Summarizing What We Know

Feature of function at a point	Feature of an antiderivative at that point
positive	
negative	
x-intercept	
increasing	
decreasing	
maximum	
minimum	

Summarizing What We Know

Feature of function at a point	Feature of an antiderivative at that point
positive	increasing
negative	decreasing
x-intercept	critical point
increasing	concave up
decreasing	concave down
maximum	inflection point
minimum	inflection point

Takeaway

In the same way that we sketch a function's derivative, we can reverse the process to sketch the antiderivative.

Antiderivatives and the F.T.C

Recall that if F is a differentiable function on an interval $[a, b]$, and $F' = f$, then:

$$\int_a^b f(x)dx = F(b) - F(a)$$

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Knowing the antiderivative allows us to compute definite integrals easily.

Submissions Closed

The cats are cuddling up in a carved out hay bale. Let t be the time, in minutes, that the cats spend in the cavity. They heat up the cavity at a rate of $r(t)$ degrees Celsius per minute. Knowing $r(t)$ for all t between 0 and 6 is enough information to determine the temperature of the cavity at $t = 6$

A True, and I know how to compute it.

B True, but I'm not sure why.

C False, but I can't explain why I think this.

D False, and I know what information is missing.

0/10 answered

Open | Closed | Responses | Correct

100%

END (ESC)

Submissions Closed

The cats are cuddling up in a carved out hay bale. Let t be the time, in minutes, that the cats spend in the cavity. They heat up the cavity at a rate of $r(t)$ degrees Celsius per minute. After six minutes, the temperature was measured to be $13^\circ C$. What is a formula that describes the temperature at $t = 0$?

A $\int_6^0 r(t)dt + 13$

B $\int_0^6 r(t)dt - 13$

C $\int_0^6 r(t)dt + 13$

D $\int_6^0 r(t)dt - 13$

0/10 answered

Open Closed Responses Correct

88%

Plans for the Future

For next time:

WeBWork 6.2 and read section 6.2