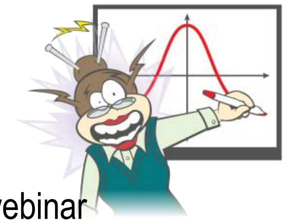
Mathematical Methods with TI-Nspire™ CX CAS

Antidifferentiation and Integration

Revision Worksheet with solutions – may be completed after viewing the webinar



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Each of the questions included here can be solved using either the TI-Nspire CX or CX CAS.

Question 1

a. Find the rule of the function $f: R \to R$ if $f'(x) = 4x^3 - 6x + 2$ and the point with coordinates $\left(-1, -\frac{5}{2}\right)$ is on the graph of f.

Response: ____________________

Question 2

For the functions f' and f in Question 1 above, display on your TI-Nspire the graph of $y = f'(x)$ and the graph of $y = f(x)$.

Hence describe the relation between key features of the graph of the antiderivative function, f, and the graph of the original function, f'.

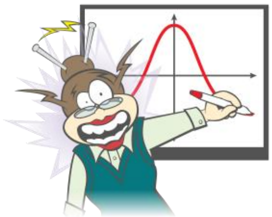
Response: ____________________

Question 3

Consider the function $f: \left(\frac{1}{2}, \infty\right) \to R,\ f(x) = \frac{3}{(2x-1)^{\frac{3}{2}}}$.

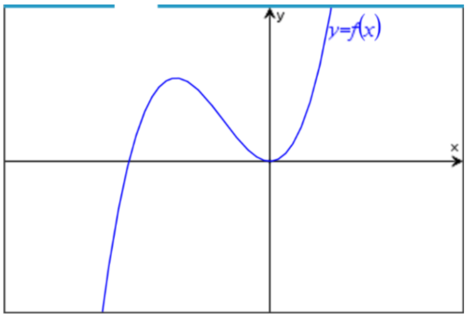
If the graph of an antiderivative, with equation $y = F(x)$, where $F'(x) = f(x)$, intersects the x-axis at $x = 1$, then $F(x)$ is equal to

A. $\frac{-9}{(2x-1)^{\frac{5}{2}}}$ B. $\frac{-9}{(2x-1)^{\frac{1}{2}}}$ C. $\frac{-3}{(2x-1)^{\frac{5}{2}}} + 3$ D. $\frac{-3}{(2x-1)^{\frac{1}{2}}}$ E. $\frac{-3}{(2x-1)^{\frac{1}{2}}} + 3$

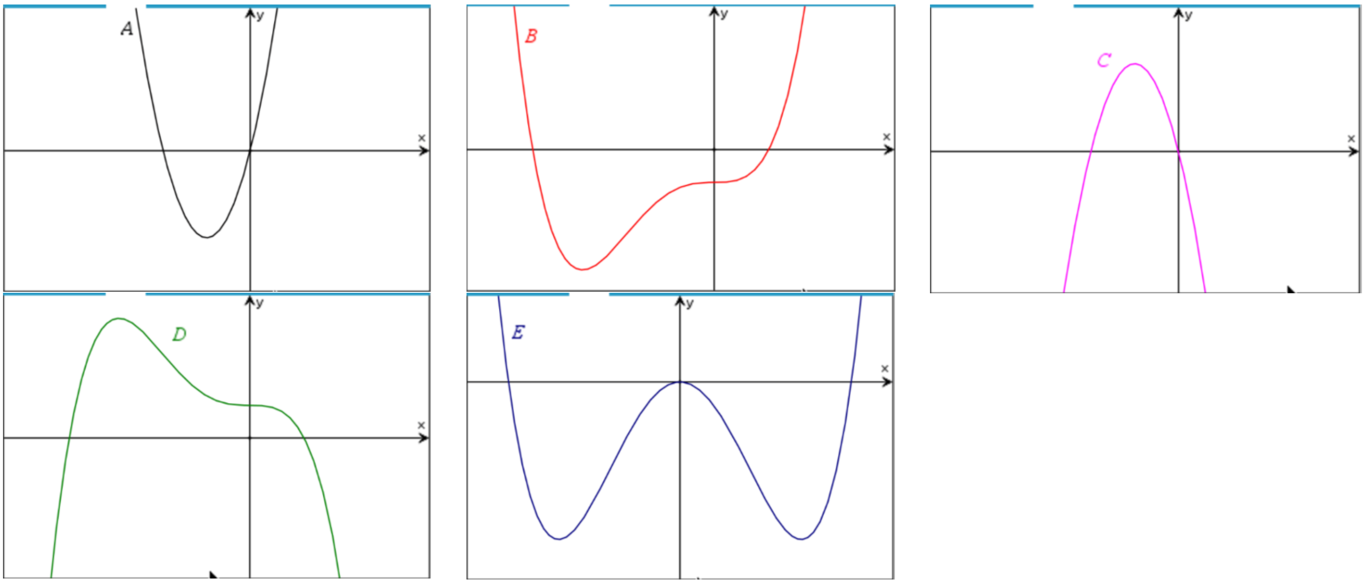


Question 4

A part of the graph of the function f is shown below.



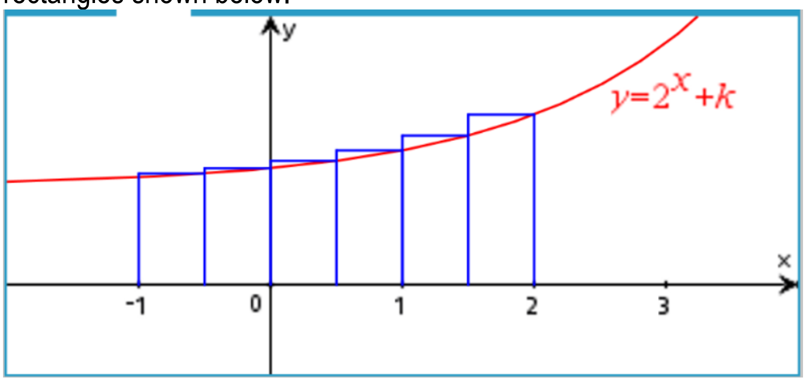
Which one of the following, A to E, could be a graph of an antiderivative of the function f ?

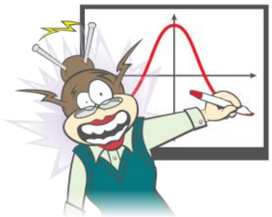


Questions 5 and 6 refer to the following.

The rule of the function g is $g(x) = 2^x + k$.

The area between the graph of g and the x-axis, over the interval $[-1, 2]$, is approximated using the six right rectangles shown below.





Question 5

If the approximated area is $\frac{80+7\sqrt{2}}{4}$, the value of k is

A. 4 B. $\frac{9}{2}$ C. 5 D. $\frac{11}{2}$ E. 6

Response: ______________________________

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Question 6

The exact area between the x-axis and the graph of g, over the interval $[-1,2]$ is closest to

A. 21.00 B. 21.55 C. 22.00 D. 22.48 E. 23.56

Response: ______________________________

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Question 7

If $\int_{-3}^{3} a\left(x^2+1\right)dx=-2$, then the value of a is

A. $\frac{1}{6}$ B. $-\frac{1}{6}$ C. $-\frac{1}{12}$ D. $\frac{1}{12}$ E. $-\frac{2}{33}$

Response: ______________________________

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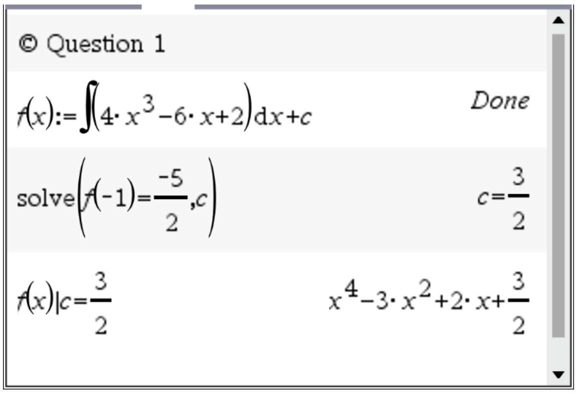
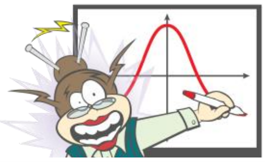
Answers

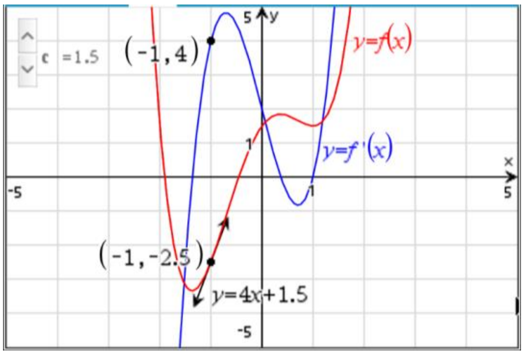
Question 1

$$f\left(x\right)=x^4-3x^2+2x+\frac{3}{2}$$





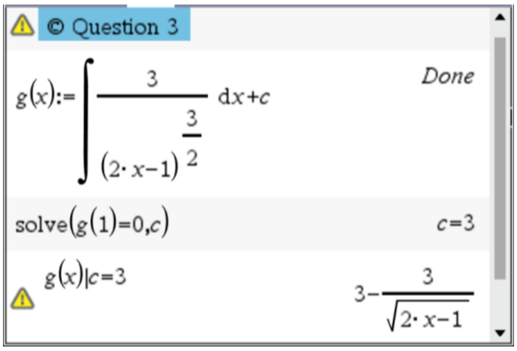
Question 2



Original graph $y = f(x)$	Antiderivative graph $y = F(x)$
$f(x) < 0$ (below x-axis)	Decreasing (negative slope)
$f(x) = 0$ (intersects x-axis)	Stationary point (zero slope)
$f(x) > 0$ (above x-axis)	Increasing (positive slope)
Turning point ($f'(x) = 0$)	Point of inflection

Question 3

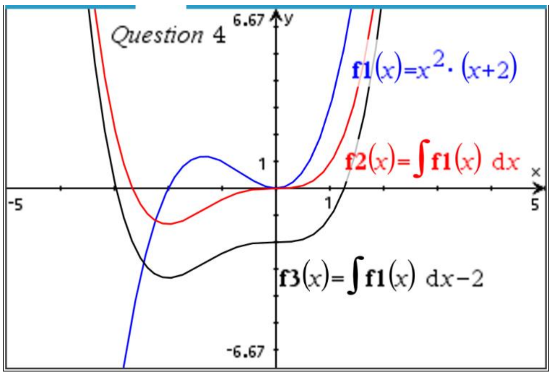
Answer: E $\dfrac{-3}{(2x-1)^{\frac{1}{2}}} + 3$

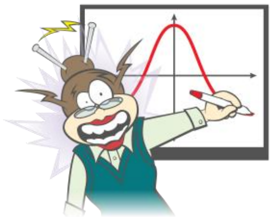


Question 4

Answer: B. $y = f(x)$ could be a positive cubic graph with a 'double root' at the origin. An antiderivative could therefore be a positive quartic graph with an inflection at $x = 0$.

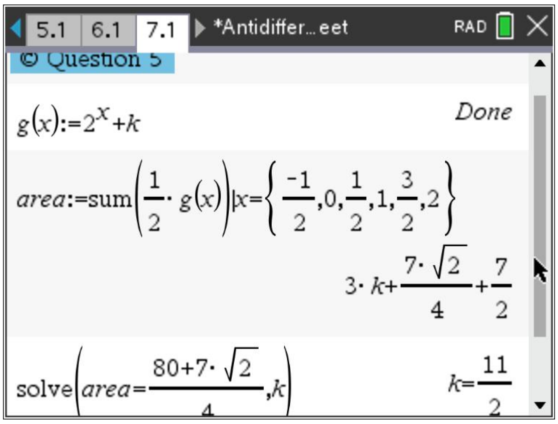
Try graphing, for example, $y = x^2(x+2)$ and an antiderivative, $y = \int \left(x^2(x+2)\right)dx + c$ (with suitable c).





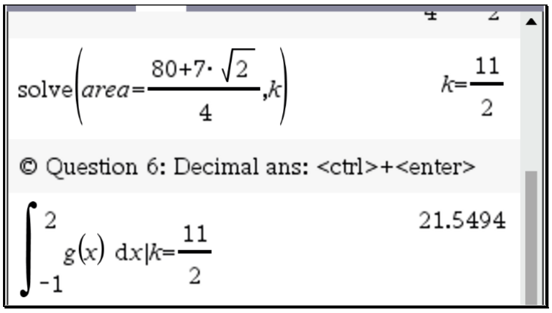
Question 5

Answer: D $\frac{11}{2}$



Question 6

Answer: B 21.55 is closest to the exact answer



Question 7

Answer: C $-\frac{1}{12}$