

## Calculus—U-Substitution Practice

Find each of the following integrals without using a calculator. Show all work to the right.

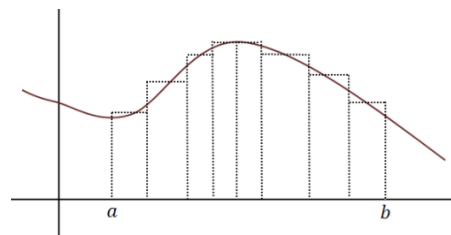
Work

1. $\int 2x(4x^2 - 3)^3 dx$	
2. $\int x^2(4x^3 - 3)^3 dx$	
3. $\int 2(4x - 3)^3 dx$	
4. $\int 2\sin(4x - 3) dx$	
5. $\int 2x\cos(4x^2 - 3) dx$	
6. $\int \sin(4x - 3)\cos(4x - 3) dx$	
7. $\int 8\sqrt{(4x - 3)^3} dx$	
8. $\int \frac{1}{\sqrt{4x - 3}} dx$	
9. $\int \frac{x}{2\sqrt{4x^2 - 3}} dx$	
10. $\int x^2(4x^2 - 3) dx$	
11. $\int \frac{2x}{(4x^2 - 3)^2} dx$	
12. $\int \frac{x^2}{(4x^3 - 3)} dx$	

## Answer Box .....

<b>A</b> $\frac{-1}{4(4x^2 - 3)} + c$	<b>B</b> $\frac{\sin(4x^2 - 3)}{4} + c$	<b>C</b> $\frac{-\cos^2(4x - 3)}{8} + c$	<b>D</b> $\frac{(4x^3 - 3)^4}{48} + c$	<b>E</b> $\frac{x^3(4x^2 - 5)}{5} + c$	<b>F</b> $\frac{4\sqrt{(4x - 3)^5}}{5} + c$
<b>G</b> $\frac{(4x - 3)^4}{8} + c$	<b>H</b> $\frac{\sqrt{4x^2 - 3}}{8} + c$	<b>I</b> $\frac{\ln 4x^3 - 3 }{12} + c$	<b>J</b> $\frac{\sqrt{4x - 3}}{2} + c$	<b>K</b> $\frac{-\cos(4x - 3)}{2} + c$	<b>L</b> $\frac{(4x^2 - 3)^4}{16} + c$

# Integration



1. $\int dt = t + \underline{\hspace{2cm}}$	2. $\int \sec^2 \theta d\theta =$																
3. $\frac{dy}{dx} = 3x^2$ and y contains (1,5) then $y =$	4. $\int_{-2}^2 (4x^2 - 7) dx =$																
5. $\int_{-2}^2 (x^{43} + 5x^7) dx =$	6. Approximate $\int_0^{18} f(t)dt$ with a Riemann sum, using the midpoints of 3 subintervals of equal length <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>t</td> <td>0</td> <td>3</td> <td>6</td> <td>9</td> <td>12</td> <td>15</td> <td>18</td> </tr> <tr> <td>f(t)</td> <td>0</td> <td>4</td> <td>8</td> <td>12</td> <td>16</td> <td>20</td> <td>25</td> </tr> </tbody> </table>	t	0	3	6	9	12	15	18	f(t)	0	4	8	12	16	20	25
t	0	3	6	9	12	15	18										
f(t)	0	4	8	12	16	20	25										
7. $\int_1^2 x^2 \sqrt{x^3 + 2} dx$	8. $\int \sin 2x dx$																
9. $\int_0^1 x(x^2 + 1)^3 dx = \frac{1}{2} \int_1^b u^3 du$ $b = \underline{\hspace{2cm}}$	10. $\frac{d}{dx} \int_{-2}^{x^3} \frac{1}{t^2} dt =$																
11. Find the average value of $f(x) = 3x^2$ over the interval [1,3]	12. $\int_{\frac{\pi}{2}}^{\pi} \cos\left(\frac{x}{3}\right) dx = \int_a^b \cos(u) du$ , $a = \underline{\hspace{2cm}}, b = \underline{\hspace{2cm}}$																

## ANSWER BOX .....

<b>A</b> $\frac{3}{x^4}$	<b>B</b> $\frac{1}{3} \int_3^{10} \sqrt{u} du$	<b>C</b> $-\frac{1}{2} \cos 2x + c$	<b>D</b> $\frac{\pi}{6}, \frac{\pi}{3}$	<b>E</b> 13	<b>F</b> 0
<b>G</b> $2 \int_0^2 (4x^2 - 7) dx$	<b>H</b> C	<b>I</b> 216	<b>J</b> $\tan \theta + c$	<b>K</b> $x^3 + 4$	<b>L</b> 2