What you'll Learn About

- Average Value
- How to take the anti-derivative of a function
- How to evaluate the anti-derivative of a function (Part of the Fundamental Theorem of Calculus

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$f'(x) = -20$

$f(x) = -20x + C$

anti-derivative

8) $\int_3^7 -20\,dx = -20x + C\Big]_3^7$

$= (-20(7)+C) - (-20(3)+C)$

$= -140 + C + 60 - C$

$= -80$

a) $\int_3^6 5\,dx = 5x\Big]_3^6$

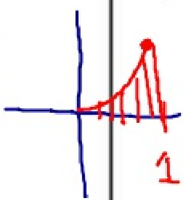
$5(6) - 5(3)$

$30 - 15$

15

$f(x) = \frac{1}{3}x^3$

$f'(x) = 3x^2$



1

b) $\int_0^1 x^2\,dx = \frac{1}{3}x^3\Big]_0^1 = \frac{x^3}{3}\Big]_0^1$

$= \frac{1}{3}(1)^3 - \frac{1}{3}(0)^3$

$= \frac{1}{3}$

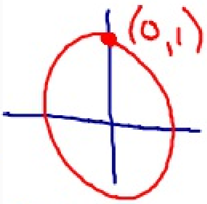
d) $\int_0^1 x^3\,dx = \frac{1}{4}x^4\Big]_0^1$

$= \frac{1}{4}(1)^4 - \frac{1}{4}(0)^4$

$= \frac{1}{4}$

$f'(x) = \sin x$

$f(x) = -\cos x$



$\tan\frac{\pi}{2} = \frac{1}{0}$

19) $\int_\pi^{2\pi} \sin x\,dx = -\cos x\Big]_\pi^{2\pi}$

$-\cos 2\pi - (-\cos\pi)$

$-(1) + (-1)$

-2

22a) $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \csc^2 x\,dx = -\cot x\Big]_{\frac{\pi}{4}}^{\frac{\pi}{2}}$

$-\cot\frac{\pi}{2} - (-\cot\frac{\pi}{4})$

$0 + 1 = 1$

24a) $\int_{-1}^4 -5x^3\,dx = -5\int_{-1}^4 x^3\,dx$

$= -5\left(\frac{1}{4}x^4\right)\Big]_{-1}^4$

$= -\frac{5}{4}x^4\Big]_{-1}^4$

$-\frac{5}{4}(4)^4 - \left(-\frac{5}{4}(-1)^4\right)$

$-5(4)^3 + \frac{5}{4}$

$-320 + 1.25 = -318.75$

$\frac{-320}{1} + \frac{5}{4}$

$\frac{-1280}{4} + \frac{5}{4}$

$\frac{-1275}{4}$

28) $\int_0^{\frac{1}{2}} \frac{1}{\sqrt{1-x^2}}\,dx =$

$\int_0^{\frac{1}{2}} \frac{1}{\sqrt{1-x^2}} = \arcsin x\Big]_0^{\frac{1}{2}}$

$\arcsin\left(\frac{1}{2}\right) - \arcsin(0)$

ratio ratio

$\frac{\pi}{6} - 0$

$\pi/6$

$\frac{3}{8} = -\frac{1}{8} + \frac{1}{2} = -\frac{1}{8} - \left(-\frac{1}{2}\right)$	$30a)\int_1^2 \frac{1}{x^3}\,dx = \int_1^2 x^{-3}\,dx$ $= -\frac{1}{2}x^{-2}\Big]_1^2$ $= \frac{-1}{2x^2}\Big]_1^2$	$30)\int_0^5 x^{3/2}\,dx = \frac{2}{5}x^{5/2}\Big]_0^5$ $\frac{2}{5}(5)^{5/2} - \frac{2}{5}(0)^{5/2}$ $\boxed{\frac{2}{5}(5)^{5/2}}$ $\boxed{2(5)^{3/2}}$
	$34)\int_0^\pi (1+\cos x)\,dx = x + \sin x\Big]_0^\pi$ $\int_0^\pi 1\,dx + \int_0^\pi \cos x\,dx$ $(\pi + \sin\pi) - (0 + \sin 0)$ π	$40)\int_0^4 \frac{1-\sqrt{x}}{\sqrt{x}}\,dx =$ $\int_0^4 \frac{(1-x^{1/2})}{x^{1/2}}$ $\int_0^4 x^{-1/2}(1-x^{1/2})$ $\int_0^4 x^{-1/2} - x^0$ $\int_0^4 x^{-1/2} - 1 = 2x^{1/2} - x\Big]_0^4$ $(2\sqrt{4} - 4) - (0 - 0)$ 0

$(1+x)(1+x)(1+x)$ $(1+2x+x^2)(1+x)$ $1+2x+x^2$ $+x+2x^2+x^3$ $1+3x+3x^2+x^3$	$39a)\int_0^1 (1+x)^3\,dx =$ $\int_0^1 1+3x+3x^2+x^3$ $\left. x+\frac{3}{2}x^2+x^3+\frac{1}{4}x^4 \right]_0^1$ $\left(1+\frac{3}{2}+1+\frac{1}{4}\right)-0$ 3.75	$39a)\int_0^1 (1+x)^3\,dx =$ $\left.\frac{1}{4}(1+x)^4\right]_0^1$ $\frac{1}{4}(1+1)^4-\frac{1}{4}(1+0)^4$ $4-\frac{1}{4}$ 3.75
$f(x)=\frac{1}{4}(1+2x)^4$ $f'(x)=(1+2x)^3\cdot 2$	$39b)\int_0^1 (1+2x)^3\,dx = \frac{1}{2}\cdot\frac{1}{4}(1+2x)^4$ $\left.=\frac{1}{8}(1+2x)^4\right]_0^1$ $\frac{1}{8}(3)^4-\frac{1}{8}$ $\frac{81}{8}-\frac{1}{8}$ 10	$A)\int_2^5 5^x\,dx = \left.\frac{5^x}{\ln 5}\right]_2^5$ $\frac{5^5}{\ln 5}-\frac{5^2}{\ln 5}$ $f(x)=5^x$ $f'(x)=5^x\cdot\ln 5$