U-Sub here or sub you here? Key

AP Calculus: 8.2 FTC with Functions

1. $\int_{-1}^{1}(8x^3+3x^2-9)dx$

$\left[\frac{8x^4}{4}+\frac{3x^3}{3}-9x\right]_{-1}^{1}=\left[2x^4+x^3-9x\right]_{-1}^{1}$

$=\left[(2+1-9)-(2-1+9)\right]=\boxed{-16}$

2. $\int_{1}^{-2}(2x^2-x)dx = -\int_{-2}^{1} 2x^2-x\,dx$

$-\left[\frac{2x^3}{3}-\frac{x^2}{2}\right]_{-2}^{1}=-\left[\left(\frac{2}{3}-\frac{1}{2}\right)-\left(\frac{-16}{3}-\frac{4}{2}\right)\right]$

$=-\left[\left(\frac{1}{6}\right)-\left(\frac{-44}{6}\right)\right]=-\frac{45}{6}=\boxed{-\frac{15}{2}}$

3. $\int_{0}^{1}\frac{4x}{\sqrt{x}}\,dx=\int_0^1 4x^{1/2}dx$

$\left[\frac{2\cdot 4x^{3/2}}{3}\right]_0^1=\left[\frac{8x^{3/2}}{3}\right]_0^1=\boxed{\frac{8}{3}}$

4. $\int_{0}^{1}\frac{2}{8}\sqrt[3]{x^5}\,dx=\int_0^1\frac{2x^{5/3}}{8}dx$

$\left[\frac{\frac{2x^{8/3}}{8}}{\frac{8}{3}}\right]_0^1=\left[\frac{6x^{8/3}}{64}\right]_0^1=\left[\frac{3x^{8/3}}{32}\right]_0^1=\boxed{\frac{3}{32}}$

5. $\int_{2}^{3}\frac{-2}{x^2}+4\,dx=\int_2^3 -2x^{-2}+4dx$

$\left[\frac{-2x^{-1}}{-1}+4x\right]_2^3=\left[\frac{2}{x}+4x\right]_2^3$

$\left[\left(\frac{2}{3}+12\right)-(1+8)\right]=\left[\frac{38}{3}-9\right]$

$=\boxed{\frac{65}{3}}$

6. $\int_{0}^{1}\frac{-2x^3-5x^2+6}{2\sqrt{x}}\,dx=\int_0^1 -x^{5/2}-\frac{5}{2}x^{3/2}+3x^{-1/2}dx$

$=\left[-\frac{2x^{7/2}}{7}-\frac{\frac{5x^{5/2}}{2}}{\frac{5}{2}}+\frac{2\cdot 3x^{1/2}}{1}\right]_0^1$

$=\left[\frac{-2x^{7/2}}{7}-x^{5/2}+6\sqrt{x}\right]_0^1=\frac{-2}{7}-1+6=\boxed{\frac{3}{7}}$

7. Find the k value.

$$-5=\int_2^k(4x+3)dx$$

$-5=\left[\frac{4x^2}{2}+3x\right]_2^k$

$-5=\left[2x^2+3x\right]_2^k$

$-5=\left[(2k^2+3k)-(8+6)\right]$

$-5=2k^2+3k-14$

$0=2k^2+3k-9$

$0=(2k-3)(k+3)$

$\boxed{k=\frac{3}{2} \quad k=-3}$