A.P. Calculus AB   Quiz 4-1 Review   No Calculators

Find the most general antiderivative of $h(x)$.

1. $h(x) = 5x^4 - 5x^2 + \pi + \dfrac{1}{2\sqrt{x}} + \dfrac{1}{3x^3}$

2. $h(x) = \dfrac{-8}{\sqrt[3]{x}} - 2\csc^2 x$

3. $h(x) = \dfrac{7}{\sqrt[5]{x}} - \dfrac{\sqrt[4]{x}}{13} + 10$

4. $h(x) = \dfrac{2x - 6x^3 + x^2}{\sqrt[3]{x}}$

5. $h(x) = -2\cos x + 5\sin x - 5\csc x\cot x$

6. Find the most general expression of $f(x)$ if $f''(x) = 9x^2 - 5x + 2$.

7. Find the most general expression of $f(x)$ if $f''(x) = 4x^3 - 5x^2 + 3x - 6$.

8. Find the specific expression of $f(x)$ if $f(x) = \int g(x)dx$, $g(x) = 3x^2 - 4x$, and $f(-1) = 2$

9. Find the specific expression of $f(x)$ if $f''(x) = 36x^2 - 6$, $f'(-1) = 3$, and $f(1) = 9$.

A.P. Calculus AB **Quiz 4-1 Review** **No Calculators** Key

* Power Rule Conditions: 1) Radicals to Rational Exponents 2) Variable in Numerator 3) Expand all terms (no parentheses)

Find the most general antiderivative of $h(x)$.

1. $h(x) = 5x^4 - 5x^2 + \pi + \frac{1}{2\sqrt{x}} + \frac{1}{3x^3}$

+1 +1 +2/2 +1

$$H(x) = \int 5x^{4} - 5x^{2} + \pi + \frac{1}{2}x^{-1/2} + \frac{1}{3}x^{-3}\,dx$$

$$\frac{5x^5}{5} - \frac{5x^3}{3} + \pi x + \frac{1}{2}\cdot\frac{x^{1/2}}{1/2} + \frac{1}{3}\cdot\frac{x^{-2}}{-2} + C$$

$$H(x) = x^5 - \frac{5}{3}x^3 + \pi x + \frac{1}{2}\cdot\frac{2}{1}x^{1/2} + \frac{1}{3}\cdot\frac{1}{-2}x^{-2} + C$$

$$\boxed{H(x) = x^5 - \frac{5}{3}x^3 + \pi x + x^{1/2} - \frac{1}{6x^2} + C}$$

2. $h(x) = \frac{-8}{\sqrt[3]{x}} - 2\csc^2 x$

$$H(x) = \int \frac{-8}{\sqrt[3]{x}}\,dx - 2\int \csc^2 x\,dx$$

+3/3

$$H(x) = \int -8x^{-1/3}\,dx - 2\int \csc^2 x\,dx$$

$$H(x) = -8\frac{x^{2/3}}{2/3} - 2(-\cot x) + C = -8\cdot\frac{3}{2}x^{2/3} + 2\cot x$$

$$\boxed{H(x) = -12x^{2/3} + 2\cot x + C}$$

3. $h(x) = \frac{7}{\sqrt[5]{x}} - \frac{\sqrt[4]{x}}{13} + 10$

$$H(x) = \int \frac{7}{\sqrt[5]{x}} - \frac{\sqrt[4]{x}}{13} + 10\,dx$$

+5/5 +4/4

$$\int 7x^{-1/5} - \frac{1}{13}x^{1/4} + 10\,dx$$

$$7\left(\frac{x^{4/5}}{4/5}\right) - \frac{1}{13}\left(\frac{x^{5/4}}{5/4}\right) + 10x + C$$

$$H(x) = 7\cdot\frac{5}{4}x^{4/5} - \frac{1}{13}\cdot\frac{4}{5}x^{5/4} + 10x + C$$

$$\boxed{H(x) = \frac{35}{4}x^{4/5} - \frac{4}{65}x^{5/4} + 10x + C}$$

4. $h(x) = \frac{2x - 6x^3 + x^2}{\sqrt[3]{x}}$

$$\int (2x - 6x^3 + x^2)x^{-1/3}\,dx$$

$$\int 2x^{3/3}x^{-1/3} - 6x^{9/3}x^{-1/3} + x^{6/3}x^{-1/3}\,dx$$

+3/3 +3/3 +3/3

$$\int 2x^{2/3} - 6x^{8/3} + x^{5/3}\,dx$$

$$\frac{2x^{5/3}}{5/3} - \frac{6x^{11/3}}{11/3} + \frac{x^{8/3}}{8/3} + C$$

$$2\cdot\frac{3}{5}x^{5/3} - 6\cdot\frac{3}{11}x^{11/3} + \frac{3}{8}x^{8/3} + C$$

$$\boxed{\frac{6}{5}x^{5/3} - \frac{18}{11}x^{11/3} + \frac{3}{8}x^{8/3} + C}$$

5. $h(x) = -2\cos x + 5\sin x - 5\csc x\cot x$

$$H(x) = \int -2\cos x + 5\sin x - 5\csc x\cot x\,dx$$

$$H(x) = -2\sin x + 5(-\cos x) - 5(-\csc x) + C$$

$$\boxed{H(x) = -2\sin x - 5\cos x + 5\csc x + C}$$

6. Find the most general expression of $f(x)$ if $f''(x) = 9x^2 - 5x + 2$.

$f'(x) = \int 9x^2 - 5x + 2\,dx$

$f'(x) = \frac{9x^3}{3} - \frac{5x^2}{2} + 2x + C$

$f'(x) = 3x^3 - \frac{5}{2}x^2 + 2x + C$

$f(x) = \int 3x^3 - \frac{5}{2}x^2 + 2x + C\,dx$

$f(x) = \frac{3x^4}{4} - \frac{5}{2}\cdot\frac{x^3}{3} + \frac{2x^2}{2} + Cx + K$

$\boxed{f(x) = \frac{3}{4}x^4 - \frac{5}{6}x^3 + x^2 + Cx + K}$

7. Find the most general expression of $f(x)$ if $f''(x) = 4x^3 - 5x^2 + 3x - 6$.

$f'(x) = \int 4x^3 - 5x^2 + 3x - 6\,dx$

$f'(x) = \frac{4x^4}{4} - \frac{5x^3}{3} + \frac{3x^2}{2} - 6x + C$

$f'(x) = x^4 - \frac{5}{3}x^3 + \frac{3}{2}x^2 - 6x + C$

$f(x) = \int x^4 - \frac{5}{3}x^3 + \frac{3}{2}x^2 - 6x + C\,dx$

$f(x) = \frac{x^5}{5} - \frac{5}{3}\cdot\frac{x^4}{4} + \frac{3}{2}\cdot\frac{x^3}{3} - \frac{6x^2}{2} + Cx + K$

$\boxed{f(x) = \frac{1}{5}x^5 - \frac{5}{12}x^4 + \frac{1}{2}x^3 - 3x^2 + Cx + K}$

8. Find the specific expression of $f(x)$ if $f(x) = \int g(x)dx$, $g(x) = 3x^2 - 4x$, and $f(-1) = 2$

$f'(x) = 3x^2 - 4x$

$f(x) = \int 3x^2 - 4x\,dx$

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

$f(-1) = 2$

$f(x) = x^3 - 2x^2 + C$

$2 = (-1)^3 - 2(-1)^2 + C$

$2 = -1 - 2 + C$

$2 = -3 + C$

$5 = C$

$\boxed{f(x) = x^3 - 2x^2 + 5}$

9. Find the specific expression of $f(x)$ if $f''(x) = 36x^2 - 6$, $f'(-1) = 3$, and $f(1) = 9$.

$f'(x) = \int 36x^2 - 6\,dx$

$f'(x) = \frac{36x^3}{3} - 6x + C$

$f'(-1) = 3$

$f'(x) = 12x^3 - 6x + C$

$3 = 12(-1)^3 - 6(-1) + C$

$3 = -12 + 6 + C$

$3 = -6 + C$

$9 = C$

$f'(x) = 12x^3 - 6x + 9$

$f(1) = 9$

$f(x) = \int 12x^3 - 6x + 9\,dx$

$f(x) = \frac{12x^4}{4} - \frac{6x^2}{2} + 9x + K$

$f(x) = 3x^4 - 3x^2 + 9x + K$

$9 = 3(1)^4 - 3(1)^2 + 9(1) + K$

$9 = 9 + K$

$0 = K$

$\boxed{f(x) = 3x^4 - 3x^2 + 9x}$