CALCULUS 6: QUIZ SOLUTIONS

Question 1

If $f(x)=3x^4$, what is $f'(x)$?

A. $f'(x)=3x^3$ B. $f'(x)=12x^3$ C. $f'(x)=4x^3$ D. $f'(x)=x^3$

Solution

$$\begin{aligned} f(x)&=3x^4 \\ \therefore f'(x)&=(4)3x^{4-1} \\ &=12x^3 \end{aligned}$$

So, the correct answer is B.

Question 2

If $y=\dfrac{2}{x^5}$, what is y'?

A. $y'=-3x^4$ B. $y'=10x^{-6}$ C. $y'=\dfrac{7}{x^4}$ D. $y'=-\dfrac{10}{x^6}$

Solution

$$\begin{aligned} y&=\frac{2}{x^5} \\ &=2x^{-5} \\ \therefore y'&=(-5)(2)x^{-5-1} \\ &=-10x^{-6} \\ &=-\frac{10}{x^6} \end{aligned}$$

So, the correct answer is D.

Question 3

If $y=\sqrt{2x}$, what is $\dfrac{dy}{dx}$?

A. $\dfrac{dy}{dx}=\frac{1}{2}\sqrt{\dfrac{2}{x}}$ B. $\dfrac{dy}{dx}=\dfrac{1}{\sqrt{x}}$ C. $\dfrac{dy}{dx}=\dfrac{2\sqrt{2}}{\sqrt{x}}$ D. $\dfrac{dy}{dx}=\dfrac{1}{2\sqrt{2x}}$

Solution

$$\begin{aligned} y&=\sqrt{2x}=\sqrt{2}\sqrt{x}=\sqrt{2}x^{\frac{1}{2}} \\ \therefore \frac{dy}{dx}&=\tfrac{1}{2}\sqrt{2}x^{\frac{1}{2}-1}=\tfrac{1}{2}\sqrt{2}x^{-\frac{1}{2}} \\ &=\tfrac{1}{2}\sqrt{2}\frac{1}{x^{\frac{1}{2}}} \qquad \left(=\tfrac{1}{2}\sqrt{2}\frac{1}{x^{\frac{1}{2}}}=\tfrac{1}{2}\sqrt{2}\frac{1}{\sqrt{x}}=\tfrac{1}{2}\frac{\sqrt{2}}{\sqrt{x}}\right) \\ &=\tfrac{1}{2}\sqrt{\frac{2}{x}} \end{aligned}$$

So, the correct answer is A.

Question 4

Determine $\frac{d}{dx}\left(\frac{1}{x^3}\right)$.

A. $\frac{3}{x^2}$ B. $-3x^4$ C. $-\frac{3}{x^4}$ D. $\frac{1}{3x^2}$

Solution

$$\begin{aligned}\frac{d}{dx}\left(\frac{1}{x^3}\right) &= \frac{d}{dx}(x^{-3}) \\ &= -3x^{-3-1} \\ &= -\frac{3}{x^4}\end{aligned}$$

So, the correct answer is C.

Question 5

What is $D_x(2\sqrt{x}+\sqrt{2})$?

A. $x+\frac{1}{2}$ B. $\frac{1}{\sqrt{x}}$ C. $\frac{1}{\sqrt{x}}+\frac{1}{2\sqrt{2}}$ D. $\sqrt{x}$

Solution

$$\begin{aligned}D_x(2\sqrt{x}+\sqrt{2}) &= D_x(2x^{\frac{1}{2}}+\sqrt{2}) \\ &= (\tfrac{1}{2})(2)x^{-\frac{1}{2}}+0 \\ &= \frac{1}{x^{\frac{1}{2}}} \\ &= \frac{1}{\sqrt{x}}\end{aligned}$$

So, the correct answer is B.