question-text
Differentiate $y = 3x^2 - 2x + 1$.

solution-text

$$y = 3x^2 - 2x + 1$$
$$\frac{dy}{dx} = 3 \cdot 2x^1 - 2$$
$$= 6x - 2$$

question-experience
10

question-order-group
a001

question-level
1

question-tags
Core 1, 2016 jun, Math

choice-text
$6x^2 - 2x + 1$
choice-correct
false

choice-text
$3x^2 - 2$
choice-correct
false

choice-text
$x^2 - x$
choice-correct
false

choice-text
$3x - 2$
choice-correct
false

choice-text
$6x - 2$
choice-correct
true

question-text
Differentiate $y = 4x^2 + 3x + 3$.

solution-text

$$y = 4x^2 + 3x + 3$$

$$\frac{dy}{dx} = 4 \cdot 2x^1 + 3$$

$$= 8x + 3$$

question-experience
10

question-order-group
a001

question-level
1

question-tags
Core 2, 2016 jan, Math

choice-text
$8x^2 + 3x + 3$
choice-correct
false

choice-text
$8x^2 + 3$
choice-correct
false

choice-text
$x^2 + x$
choice-correct
false

choice-text
$4x + 3$
choice-correct
false

choice-text
$8x + 3$
choice-correct
true

question-text
Differentiate $y = 2x^{-2} + 5x - 4$.

solution-text

$$y = 2x^{-2} + 5x - 4$$

$$\frac{dy}{dx} = 2 \cdot -2x^{-3} + 5$$

$$= -4x^{-3} + 5$$

question-experience
10

question-order-group
a001

question-level
1

question-tags
Core 2, 2016 jan, Math

choice-text
$-4x^{-2} + 5x - 4$
choice-correct
false

choice-text
$-4x^2 + 5$
choice-correct
false

choice-text
$x^{-2} + x$
choice-correct
false

choice-text
$2x^{-3} + 5$
choice-correct
false

choice-text
$-4x^{-3} + 5$
choice-correct
true

question-text
Differentiate $f(x) = x^4 - 2x^{-2} + 3x + 2$.

solution-text

$$\begin{aligned} f(x) &= x^4 - 2x^{-2} + 3x + 2 \\ f'(x) &= 4x^3 - 2 \cdot -2x^{-3} + 3 \\ &= 4x^3 + 4x^{-3} + 3 \end{aligned}$$

question-experience
10

question-order-group
a002

question-level
1

choice-text
$4x^4 + 4x^{-2} + 3x + 2$
choice-correct
false

choice-text
$4x^4 + 4x^{-3} + 3$
choice-correct
false

choice-text
$x^4 - x^{-2} + x$
choice-correct
false

choice-text
$x^3 - 2x^{-3} + 3$
choice-correct
false

choice-text
$4x^3 + 4x^{-3} + 3$
choice-correct
true

question-text
Differentiate $f(x) = x^5 + 3x^{-3} - 4x + 5$.

solution-text

$$\begin{aligned} f(x) &= x^5 + 3x^{-3} - 4x + 5 \\ f'(x) &= 5x^4 + 3 \cdot -3x^{-4} - 4 \\ &= 5x^4 - 9x^{-4} - 4 \end{aligned}$$

question-experience
10

question-order-group
a002

question-level
1

choice-text
$5x^5 - 9x^{-3} - 4x + 5$
choice-correct
false

choice-text
$5x^5 - 9x^{-4} - 4$
choice-correct
false

choice-text
$x^5 + x^{-3} - x$

choice-correct
false

choice-text
$x^4 + 3x^{-4} - 4$
choice-correct
false

choice-text
$5x^4 - 9x^{-4} - 4$
choice-correct
true

question-text
Differentiate $f(x) = x^{-3} - 4x^2 + 2x - 6$.

solution-text

$$\begin{aligned} f(x) &= x^{-3} - 4x^2 + 2x - 6 \\ f'(x) &= -3x^{-4} - 4 \cdot 2x^1 + 2 \\ &= -3x^{-4} - 8x + 2 \end{aligned}$$

question-experience
10

question-order-group
a002

question-level
1

choice-text
$-3x^{-3} - 8x^2 + 2 - 6$
choice-correct
false

choice-text
$-3x^{-3} - 8x + 2$
choice-correct
false

choice-text
$x^{-3} - x^2 + x$
choice-correct
false

choice-text
$x^{-4} - 4x + 2$
choice-correct
false

choice-text
$-3x^{-4} - 8x + 2$
choice-correct

true

question-text
Differentiate $y = (3x - 5)(2x + 4)$.

solution-text

$$\begin{aligned} y &= (3x - 5)(2x + 4) \\ y &= 6x^2 + 2x - 20 \\ \frac{dy}{dx} &= 6 \cdot 2x^1 + 2 \\ &= 12x + 2 \end{aligned}$$

question-experience
15

question-order-group
a003

question-level
1

choice-text
$12x^2 + 2x - 20$
choice-correct
false

choice-text
$12x^2 + 2$
choice-correct
false

choice-text
$x^2 + x$
choice-correct
false

choice-text
$6x + 2$
choice-correct
false

choice-text
$12x + 2$
choice-correct
true

question-text
Differentiate $y = (2x + 3)(3x - 5)$.

solution-text

$$y = (2x + 3)(3x - 5)$$

$$y = 6x^2 - x - 15$$

$$\frac{dy}{dx} = 6 \cdot 2x^1 - 1$$

$$= 12x - 1$$

question-experience
15

question-order-group
a003

question-level
1

choice-text
$12x^2 - x - 15$
choice-correct
false

choice-text
$12x^2 - 1$
choice-correct
false

choice-text
$x^2 - x$
choice-correct
false

choice-text
$6x - 1$
choice-correct
false

choice-text
$12x - 1$
choice-correct
true

question-text
Differentiate $y = (3x - 4)(2x + 3)$.

solution-text

$$y = (3x - 4)(2x + 3)$$

$$y = 6x^2 + x - 12$$

$$\frac{dy}{dx} = 6 \cdot 2x^1 + 1$$

$$= 12x + 1$$

question-experience
15

question-order-group
a003

question-level
1

choice-text
$12x^2 + x - 12$
choice-correct
false

choice-text
$12x^2 + 1$
choice-correct
false

choice-text
$x^2 + x$
choice-correct
false

choice-text
$6x + 1$
choice-correct
false

choice-text
$12x + 1$
choice-correct
true

question-text
Differentiate $f(x) = (2x^2 - 3)(x + x^{-2})$.

solution-text

$$\begin{aligned} f(x) &= (2x^2 - 3)(x + x^{-2}) \\ f(x) &= 2x^3 + 2 - 3x - 3x^{-2} \\ f'(x) &= 2 \cdot 3x^2 - 3 - 3(-2x^{-3}) \\ &= 6x^2 - 3 + 6x^{-3} \end{aligned}$$

question-experience
20

question-order-group
a004

question-level
1

choice-text
$6x^3 + 2 - 3x + 6x^{-2}$

choice-correct
false

choice-text
$6x^3 - 3 + 6x^{-3}$
choice-correct
false

choice-text
$x^3 - x - x^{-2}$
choice-correct
false

choice-text
$2x^2 - 3 - 3x^{-2}$
choice-correct
false

choice-text
$6x^2 - 3 + 6x^{-3}$
choice-correct
true

question-text
Differentiate $f(x) = (3x + 2x^{-2})(x - 3x^2)$.

solution-text

$$\begin{aligned} f(x) &= (3x + 2x^{-2})(x - 3x^2) \\ f(x) &= 3x^2 - 9x^3 + 2x^{-1} - 6 \\ f'(x) &= 3 \cdot 2x^1 - 9 \cdot 3x^2 + 2(-1x^{-2}) \\ &= 6x - 27x^2 - 2x^{-2} \end{aligned}$$

question-experience
20

question-order-group
a004

question-level
1

choice-text
$-21x^2 - 2x^{-2}$
choice-correct
false

choice-text
$6x^2 - 27x^2 - 2x^{-2}$
choice-correct
false

choice-text
$x^2 - x^3 + x^{-1}$
choice-correct

false

choice-text
$3x - 9x^2 + 2x^{-2}$
choice-correct
false

choice-text
$6x - 27x^2 - 2x^{-2}$
choice-correct
true

question-text
Differentiate $f(x) = (4x + 3)(x^{-2} - x^3)$.

solution-text

$$
\begin{aligned}
f(x) &= (4x + 3)(x^{-2} - x^3) \\
f(x) &= 4x^{-1} - 4x^4 + 3x^{-2} - 3x^3 \\
f'(x) &= 4(-1x^{-2}) - 4 \cdot 4x^3 + 3(-2x^{-3}) - 3 \cdot 3x^2 \\
&= -4x^{-2} - 16x^3 - 6x^{-3} - 9x^2
\end{aligned}
$$

question-experience
20

question-order-group
a004

question-level
1

choice-text
$-4x^{-1} - 16x^4 - 6x^{-2} - 9x^3$
choice-correct
false

choice-text
$-4x^{-1} - 16x^3 - 6x^{-3} - 9x^2$
choice-correct
false

choice-text
$x^{-1} - x^4 + x^{-2} - x^3$
choice-correct
false

choice-text
$4x^{-2} - 4x^3 + 3x^{-3} - 3x^2$
choice-correct
false

choice-text
$-4x^{-2} - 16x^3 - 6x^{-3} - 9x^2$
choice-correct

true

question-text

Differentiate $y = \dfrac{3x^3 - 4 + 5\sqrt{x}}{x^2}$.

solution-text

$$y = \frac{3x^3 - 4 + 5\sqrt{x}}{x^2}$$
$$y = 3x^{(3-2)} - 4x^{(0-2)} + 5x^{(\frac{1}{2}-2)}$$
$$y = 3x - 4x^{-2} + 5x^{-\frac{3}{2}}$$
$$\frac{dy}{dx} = 3 - 4\cdot(-2)x^{-3} + 5\cdot\left(-\frac{3}{2}\right)x^{-\frac{5}{2}}$$
$$= 3 + 8x^{-3} - \frac{15}{2}x^{-\frac{5}{2}}$$

question-experience

20

question-order-group

a005

question-level

1

choice-text

$3x + 8x^{-2} - \frac{15}{2}x^{-\frac{3}{2}}$

choice-correct

false

choice-text

$3x + 8x^{-3} - \frac{15}{2}x^{-\frac{5}{2}}$

choice-correct

false

choice-text

$x - x^{-2} + x^{-\frac{3}{2}}$

choice-correct

false

choice-text

$3 - 4x^{-3} + 5x^{-\frac{5}{2}}$

choice-correct

false

choice-text

$3 + 8x^{-3} - \frac{15}{2}x^{-\frac{5}{2}}$

choice-correct

true

question-text

Differentiate $y = \dfrac{4x - \sqrt{x} + 3x^{-1}}{x^2}$.

solution-text

$$y = \frac{4x - \sqrt{x} + 3x^{-1}}{x^2}$$

$$y = 4x^{(1-2)} - x^{(\frac{1}{2}-2)} + 3x^{(-1-2)}$$

$$y = 4x^{-1} - x^{-\frac{3}{2}} + 3x^{-3}$$

$$\frac{dy}{dx} = 4\cdot(-1)x^{-2} - \left(-\frac{3}{2}\right)x^{(-\frac{5}{2})} + 3\cdot(-3)x^{-4}$$

$$= -4x^{-2} + \frac{3}{2}x^{-\frac{5}{2}} - 9x^{-4}$$

question-experience
20

question-order-group
a005

question-level
1

choice-text
$-4x^{-1} + \frac{3}{2}x^{-\frac{3}{2}} - 9x^{-3}$
choice-correct
false

choice-text
$-4x^{-1} + \frac{3}{2}x^{-\frac{5}{2}} - 9x^{-4}$
choice-correct
false

choice-text
$x^{-1} - x^{-\frac{3}{2}} + x^{-3}$
choice-correct
false

choice-text
$4x^{-2} - x^{-\frac{5}{2}} + 3x^{-4}$
choice-correct
false

choice-text
$-4x^{-2} + \frac{3}{2}x^{-\frac{5}{2}} - 9x^{-4}$
choice-correct
true

question-text
Differentiate $y = \dfrac{3x^2 + 2\sqrt{x} - 4x^{-1}}{x^2}$.

solution-text

$$y = \frac{3x^2 + 2\sqrt{x} - 4x^{-1}}{x^2}$$

$$y = 3x^{2-2} + 2x^{\frac{1}{2}-2} - 4x^{-1-2}$$

$$y = 3 + 2x^{-\frac{3}{2}} - 4x^{-3}$$

$$\frac{dy}{dx} = 2\cdot -\frac{3}{2}x^{-\frac{5}{2}} - 4\cdot(-3)x^{-4}$$

$$= -3x^{-\frac{5}{2}} + 12x^{-4}$$

question-experience
20

question-order-group
a005

question-level
1

choice-text
$-3x^{-\frac{3}{2}} + 12x^{-3}$
choice-correct
false

choice-text
$-3x^{-\frac{3}{2}} + 12x^{-4}$
choice-correct
false

choice-text
$x^{-\frac{3}{2}} - x^{-3}$
choice-correct
false

choice-text
$2x^{-\frac{5}{2}} - 4x^{-4}$
choice-correct
false

choice-text
$-3x^{-\frac{5}{2}} + 12x^{-4}$
choice-correct
true

question-text
Differentiate $y = \frac{2x - 3x^2 + \sqrt{x}}{x\sqrt{x}}$.

solution-text

$$y = \frac{2x - 3x^2 + \sqrt{x}}{x\sqrt{x}}$$

$$y = 2x^{\left(1-\frac{3}{2}\right)} - 3x^{\left(2-\frac{3}{2}\right)} + x^{\left(\frac{1}{2}-\frac{3}{2}\right)}$$

$$y = 2x^{-\frac{1}{2}} - 3x^{\frac{1}{2}} + x^{-1}$$

$$\frac{dy}{dx} = 2\cdot -\frac{1}{2}x^{-\frac{3}{2}} - 3\cdot\left(\frac{1}{2}\right)x^{-\frac{1}{2}} + (-1)x^{-2}$$

$$= -x^{-\frac{3}{2}} - \frac{3}{2}x^{-\frac{1}{2}} - x^{-2}$$

question-experience
25

question-order-group
a006

question-level
1

choice-text
$-x^{-\frac{1}{2}} - \frac{3}{2}x^{\frac{1}{2}} - x^{-1}$
choice-correct
false

choice-text
$-x^{-\frac{1}{2}} - \frac{3}{2}x^{-\frac{1}{2}} - x^{-2}$
choice-correct
false

choice-text
$x^{-\frac{1}{2}} - x^{\frac{1}{2}} + x^{-1}$
choice-correct
false

choice-text
$2x^{-\frac{3}{2}} - 3x^{-\frac{1}{2}} + x^{-2}$
choice-correct
false

choice-text
$-x^{-\frac{3}{2}} - \frac{3}{2}x^{-\frac{1}{2}} - x^{-2}$
choice-correct
true

question-text
Differentiate $y = \frac{3x^2 - 4\sqrt{x} - x^{-1}}{x\sqrt{x}}$.

solution-text

$$y = \frac{3x^2 - 4\sqrt{x} - x^{-1}}{x\sqrt{x}}$$

$$y = 3x^{(2-\frac{3}{2})} - 4x^{(\frac{1}{2}-\frac{3}{2})} - x^{(-1-\frac{3}{2})}$$

$$y = 3x^{\frac{1}{2}} - 4x^{-1} - x^{-\frac{5}{2}}$$

$$\frac{dy}{dx} = 3\cdot\frac{1}{2}x^{-\frac{1}{2}} - 4\cdot(-1)x^{-2} - \left(-\frac{5}{2}\right)x^{-\frac{7}{2}}$$

$$= \frac{3}{2}x^{-\frac{1}{2}} + 4x^{-2} + \frac{5}{2}x^{-\frac{7}{2}}$$

question-experience
25

question-order-group
a006

question-level
1

choice-text
$\frac{3}{2}x^{\frac{1}{2}} + 4x^{-1} + \frac{5}{2}x^{-\frac{5}{2}}$
choice-correct
false

choice-text
$\frac{3}{2}x^{\frac{1}{2}} + 4x^{-2} + \frac{5}{2}x^{-\frac{7}{2}}$
choice-correct
false

choice-text
$x^{\frac{1}{2}} - x^{-1} - x^{-\frac{5}{2}}$
choice-correct
false

choice-text
$3x^{-\frac{1}{2}} - 4x^{-2} - x^{-\frac{7}{2}}$
choice-correct
false

choice-text
$\frac{3}{2}x^{-\frac{1}{2}} + 4x^{-2} + \frac{5}{2}x^{-\frac{7}{2}}$
choice-correct
true

question-text
Differentiate $y = \frac{4x + \sqrt{x} - 3x^{-2}}{x\sqrt{x}}$.

solution-text

$$y = \frac{4x + \sqrt{x} - 3x^{-2}}{x\sqrt{x}}$$

$$y = 4x^{(1-\frac{3}{2})} + x^{(\frac{1}{2}-\frac{3}{2})} - 3x^{(-2-\frac{3}{2})}$$

$$y = 4x^{-\frac{1}{2}} + x^{-1} - 3x^{-\frac{7}{2}}$$

$$\frac{dy}{dx} = 4 \cdot -\frac{1}{2}x^{-\frac{3}{2}} + (-1)x^{-2} - 3 \cdot \left(-\frac{7}{2}\right) x^{-\frac{9}{2}}$$

$$= -2x^{-\frac{3}{2}} - x^{-2} + \frac{21}{2}x^{-\frac{9}{2}}$$

question-experience
25

question-order-group
a006

question-level
1

choice-text
$-2x^{-\frac{1}{2}} - x^{-1} + \frac{21}{2}x^{-\frac{7}{2}}$
choice-correct
false

choice-text
$-2x^{-\frac{1}{2}} - x^{-2} + \frac{21}{2}x^{-\frac{9}{2}}$
choice-correct
false

choice-text
$x^{-\frac{1}{2}} + x^{-1} - x^{-\frac{7}{2}}$
choice-correct
false

choice-text
$4x^{-\frac{3}{2}} + x^{-2} - 3x^{-\frac{9}{2}}$
choice-correct
false

choice-text
$-2x^{-\frac{3}{2}} - x^{-2} + \frac{21}{2}x^{-\frac{9}{2}}$
choice-correct
true

question-text
Find the value of $\frac{dy}{dx}$ at $x = 2$ for the curve $y = x^3 - 3x^2 + 2x - 1$.

solution-text

$$y = x^3 - 3x^2 + 2x - 1$$

$$\frac{dy}{dx} = 3x^2 - 3\cdot 2x + 2$$

$$= 3x^2 - 6x + 2$$

$$\frac{dy}{dx} = 3x^2 - 6x + 2 \qquad x = 2$$

$$= 3(2)^2 - 6(2) + 2$$

$$= 3\cdot 4 - 12 + 2$$

$$= 12 - 12 + 2$$

$$= 2$$

question-experience
20

question-order-group
a007

question-level
1

answer-label
$\frac{dy}{dx} =$

answer-value
2

answer-hint
Give integer solution.

question-text
Find the value of $\frac{dy}{dx}$ at $x = 2$ for the curve $y = 2x^3 + 2x^2 + x - 2$.

solution-text

$$y = 2x^3 + 2x^2 + x - 2$$

$$\frac{dy}{dx} = 2\cdot 3x^2 + 2\cdot 2x + 1$$

$$= 6x^2 + 4x + 1$$

$$\frac{dy}{dx} = 6x^2 + 4x + 1 \qquad x = 2$$

$$= 6(2)^2 + 4(2) + 1$$

$$= 6\cdot 4 + 8 + 1$$

$$= 24 + 8 + 1$$

$$= 33$$

question-experience
20

question-order-group
a007

question-level
1

answer-label
$\frac{dy}{dx} =$

answer-value
33

answer-hint
Give integer solution.

question-text
Find the value of $\frac{dy}{dx}$ at $x = 2$ for the curve $y = x^3 - 5x^2 - x - 4$.

solution-text

$$y = x^3 - 5x^2 - x - 4$$

$$\frac{dy}{dx} = 3x^2 - 5 \cdot 2x - 1$$

$$= 3x^2 - 10x - 1$$

$$\frac{dy}{dx} = 3x^2 - 10x - 1 \qquad x = 2$$

$$= 3(2)^2 - 10(2) - 1$$

$$= 3 \cdot 4 - 20 - 1$$

$$= 12 - 20 - 1$$

$$= -9$$

question-experience
20

question-order-group
a007

question-level
1

answer-label
$\frac{dy}{dx} =$

answer-value
-9

answer-hint
Give integer solution.

question-text
Given $f(x) = x^2 - 2x^{-1} + 3x - 1$, find the value of $f'(1)$.

solution-text

$$f(x) = x^2 - 2x^{-1} + 3x - 1$$
$$f'(x) = 2x - 2\cdot(-1)x^{-2} + 3$$
$$= 2x + 2x^{-2} + 3$$

$$f'(x) = 2x + 2x^{-2} + 3 \qquad x = 1$$
$$f'(1) = 2(1) + 2(1)^{-2} + 3$$
$$= 2 + 2 + 3$$
$$= 7$$

question-experience
20

question-order-group
a008

question-level
1

answer-label
$f'(x) =$

answer-value
7

answer-hint
Give integer solution.

question-text
Given $f(x) = x^3 - 3x^{-1} + 4x - 3$, find the value of $f'(1)$.

solution-text

$$f(x) = x^3 - 3x^{-1} + 4x - 3$$
$$f'(x) = 3\cdot x^2 - 3\cdot(-1)x^{-2} + 4$$
$$= 3x^2 + 3x^{-2} + 4$$

$$f'(x) = 3x^2 + 3x^{-2} + 4 \qquad x = 1$$
$$f'(1) = 3(1)^2 + 3(1)^{-2} + 4$$
$$= 3 + 3 + 4$$
$$= 10$$

question-experience
20

question-order-group
a008

question-level
1

answer-label
$f'(x) =$

answer-value
10

answer-hint
Give integer solution.

question-text
Given $f(x) = x^2 + 4x^{-1} - 5x + 1$, find the value of $f'(1)$.

solution-text

$$f(x) = x^2 + 4x^{-1} - 5x + 1$$
$$f'(x) = 2x^1 + 4 \cdot (-1)x^{-2} - 5$$
$$= 2x - 4x^{-2} - 5$$

$$f'(x) = 2x - 4x^{-2} - 5 \qquad x = 1$$
$$f'(1) = 2(1) - 4(1)^{-2} - 5$$
$$= 2 - 4 - 5$$
$$= -7$$

question-experience
20

question-order-group
a008

question-level
1

answer-label
$f'(x) =$

answer-value
-7

answer-hint
Give integer solution.

question-text
Given $y = 3x^3 - 2x^2 + x - 1$, find the value of $\frac{d^2y}{dx^2}$ at $x = 3$.

solution-text

$$y = 3x^3 - 2x^2 + x - 1$$

$$\frac{dy}{dx} = 3 \cdot 3x^2 - 2 \cdot 2x + 1$$

$$= 9x^2 - 4x + 1$$

$$\frac{d^2y}{dx^2} = 9 \cdot 2x - 4$$

$$= 18x - 4$$

$$\frac{d^2y}{dx^2} = 18x - 4 \qquad x = 3$$

$$\frac{d^2y}{dx^2} = 18(3) - 4$$

$$= 54 - 4$$

$$= 50$$

question-experience
20

question-order-group
a009

question-level
1

answer-label
$\frac{d^2y}{dx^2} =$

answer-value
50

answer-hint
Give integer solution.

question-text
Given $y = 2x^3 + 2x^2 - 5x + 4$, find the value of $\frac{d^2y}{dx^2}$ at $x = 3$.

solution-text

$$y = 2x^3 + 2x^2 - 5x + 4$$

$$\frac{dy}{dx} = 2 \cdot 3x^2 + 2 \cdot 2x - 5$$

$$= 6x^2 + 4x - 5$$

$$\frac{d^2y}{dx^2} = 6 \cdot 2x + 4$$

$$= 12x + 4$$

$$\frac{d^2y}{dx^2} = 12x + 4 \qquad x = 3$$

$$\frac{d^2y}{dx^2} = 12(3) + 4$$

$$= 36 + 4$$

$$= 40$$

question-experience
20

question-order-group
a009

question-level
1

answer-label
$\frac{d^2y}{dx^2} =$

answer-value
40

answer-hint
Give integer solution.

question-text
Given $y = 3x^3 - 5x^2 - 7x + 7$, find the value of $\frac{d^2y}{dx^2}$ at $x = 3$.

solution-text

$$y = 3x^3 - 5x^2 - 7x + 7$$

$$\frac{dy}{dx} = 3 \cdot 3x^2 - 5 \cdot 2x - 7$$

$$= 9x^2 - 10x - 7$$

$$\frac{d^2y}{dx^2} = 9 \cdot 2x - 10$$

$$= 18x - 10$$

$$\frac{d^2y}{dx^2} = 18x - 10 \qquad x = 3$$

$$\frac{d^2y}{dx^2} = 18(3) - 10$$

$$= 54 - 10$$

$$= 44$$

question-experience
20

question-order-group
a009

question-level
1

answer-label
$\frac{d^2y}{dx^2} =$

answer-value
44

answer-hint
Give integer solution.

question-text
Given $f(x) = (4x^2 - 3)(2x - 4)$, find the value of $f''(-1)$.

solution-text

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

$$f(x) = 8x^3 - 16x^2 - 6x + 12$$

$$f'(x) = 8 \cdot 3x^2 - 16 \cdot 2x - 6$$

$$= 24x^2 - 32x - 6$$

$$f''(x) = 24 \cdot 2x - 32$$

$$= 48x - 32$$

$$f''(x) = 48x - 32 \qquad x = -1$$

$$f''(x) = 48(-1) - 32$$

$$= -48 - 32$$

$$= -80$$

question-experience
25

question-order-group
a010

question-level
1

answer-label
$f''(x) =$

answer-value
-80

answer-hint
Give integer solution.

question-text
Given $f(x) = (3x - x^2)(x + 2)$, find the value of $f''(-1)$.

solution-text

$$
\begin{aligned}
f(x) &= (3x - x^2)(x + 2) \\
f(x) &= 3x^2 + 9x - x^3 - 2x^2 \\
f(x) &= -x^3 + x^2 + 9x \\
f'(x) &= 3 \cdot -x^2 + 2x + 9 \\
&= -3x^2 + 2x + 9 \\
f''(x) &= -3 \cdot 2x + 2 \\
&= -6x + 2
\end{aligned}
$$

$$
\begin{aligned}
f''(x) &= -6x + 2 \qquad x = -1 \\
f''(x) &= -6(-1) + 2 \\
&= 6 + 2 \\
&= 8
\end{aligned}
$$

question-experience
25

question-order-group
a010

question-level
1

answer-label
$f''(x) =$

answer-value
8

answer-hint

Give integer solution.

question-text

Given $f(x) = (2x^2 - 3x)(x - 5)$, find the value of $f''(-1)$.

solution-text

$$f(x) = (2x^2 - 3x)(x - 5)$$
$$f(x) = 2x^3 - 10x^2 - 3x^2 + 15x$$
$$f(x) = 2x^3 - 13x^2 + 15x$$
$$f'(x) = 2 \cdot 3x^2 - 13 \cdot 2x + 15$$
$$= 6x^2 - 26x + 15$$
$$f''(x) = 6 \cdot 2x - 26$$
$$= 12x - 26$$

$$f''(x) = 12x - 26 \qquad x = -1$$
$$f''(x) = 12(-1) - 26$$
$$= -12 - 26$$
$$= -38$$

question-experience

25

question-order-group

a010

question-level

1

answer-label

$f''(x) =$

answer-value

-38

answer-hint

Give integer solution.

question-text

Find the equation of the tangent of the curve $y = 2x^2 - 9x + 3$ at $x = 3$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text

At $x = 3$, $\qquad y = 2(3)^2 - 9(3) + 3 = 2 \cdot 9 - 27 + 3 = -6$

$$\frac{dy}{dx} = 2 \cdot 2x - 9$$
$$\frac{dy}{dx} = 4x - 9$$

At $x = 3$, $\qquad \frac{dy}{dx} = 4(3) - 9 = 12 - 9 = 3 \quad \Rightarrow \quad$ tangent gradient

$(3, -6)$ $m = 3$

$$3(x-3) = y - (-6)$$

$$3x - 9 = y + 6$$

$$3x - 9 - 6 = y$$

$$y = 3x - 15$$

$m = 3$ $c = -15$

question-experience
25

question-order-group
a011

question-level
1

answer-label
$m =$

answer-value
3

answer-hint
Give integer solution.

answer-label
$c =$

answer-value
-15

answer-hint
Give integer solution.

question-text
Find the equation of the tangent of the curve $y = x^2 - 3x - 2$ at $x = 3$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text
At $x = 3$, $y = (3)^2 - 3(3) - 2 = 9 - 9 - 2 = -2$

$$\frac{dy}{dx} = 2x - 3$$

At $x = 3$, $\frac{dy}{dx} = 2(3) - 3 = 6 - 3 = 3$ $\Rightarrow$ tangent gradient

$(3, -2)$ $m = 3$

$$3(x-3) = y - (-2)$$

$$3x - 9 = y + 2$$

$$3x - 9 - 2 = y$$

$$y = 3x - 11$$

$m = 3$ $c = -11$

question-experience
25

question-order-group
a011

question-level
1

answer-label
$m =$

answer-value
3

answer-hint
Give integer solution.

answer-label
$c =$

answer-value
-11

answer-hint
Give integer solution.

question-text
Find the equation of the tangent of the curve $y = x^2 - 7x + 5$ at $x = 3$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text
At $x = 3, \qquad y = (3)^2 - 7(3) + 5 = 9 - 21 + 5 = -7$

$$\frac{dy}{dx} = 2x - 7$$

At $x = 3, \qquad \frac{dy}{dx} = 2(3) - 7 = 6 - 7 = -1 \quad \Rightarrow \quad$ tangent gradient

$(3, -7) \qquad m = -1$

$$-1(x - 3) = y - (-7)$$
$$-x + 3 = y + 7$$
$$-x + 3 - 7 = y$$
$$y = -x - 4$$

$m = -1 \qquad c = -4$

question-experience
25

question-order-group
a011

question-level
1

answer-label
$m =$

answer-value
-1

answer-hint

Give integer solution.

answer-label

$c =$

answer-value

-4

answer-hint

Give integer solution.

question-text

Find the equation of the normal of the curve $y = 2x^2 - 2x + 5$ at $x = 1$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text

At $x = 1$, $\quad y = 2(1)^2 - 2(1) + 5 = 2 - 2 + 5 = 5$

$$\frac{dy}{dx} = 2 \cdot 2x - 2$$
$$= 4x - 2$$

At $x = 1$, $\quad \frac{dy}{dx} = 4(1) - 2 = 4 - 2 = 2 \quad \Rightarrow \quad$ normal gradient $= -\frac{1}{\frac{dy}{dx}} = -\frac{1}{2}$

$(1, 5) \qquad m = -\frac{1}{2}$

$$-\frac{1}{2}(x - 1) = y - 5$$
$$-1(x - 1) = 2(y - 5)$$
$$-x + 1 = 2y - 10$$
$$-x + 1 + 10 = 2y$$
$$2y = -x + 11$$
$$y = -\frac{1}{2}x + \frac{11}{2}$$
$$y = -0.5x + 5.5$$

$m = -0.5 \qquad c = 5.5$

question-experience

25

question-order-group

a012

question-level

1

answer-label

$m =$

answer-value

-0.5

answer-hint

Give integer solution.

answer-label

$c =$

answer-value

5.5

answer-hint

Give integer solution.

question-text

Find the equation of the normal of the curve $y = 2x^2 - 5x + 3$ at $x = 1$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text

At $x = 1$, $\quad y = 2(1)^2 - 5(1) + 3 = 2 - 5 + 3 = 0$

$$\frac{dy}{dx} = 2 \cdot 2x - 5$$

$$= 4x - 5$$

At $x = 1$, $\quad \frac{dy}{dx} = 4(1) - 5 = 4 - 5 = -1 \quad \Rightarrow \quad$ normal gradient $= -\frac{1}{\frac{dy}{dx}} = -\frac{1}{-1} = 1$

$(1, 0) \quad m = 1$

$$1(x - 1) = y - 0$$

$$y = x - 1$$

$m = 1 \quad c = -1$

question-experience

25

question-order-group

a012

question-level

1

answer-label

$m =$

answer-value

1

answer-hint

Give integer solution.

answer-label

$c =$

answer-value

-1

answer-hint

Give integer solution.

question-text

Find the equation of the normal of the curve $y = 3x^2 - 7x + 7$ at $x = 1$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text

At $x = 1$, $y = 3(1)^2 - 7(1) + 7 = 3 - 7 + 7 = 3$

$$\frac{dy}{dx} = 3 \cdot 2x - 7$$
$$= 6x - 7$$

At $x = 1$, $\frac{dy}{dx} = 6(1) - 7 = 6 - 7 = -1 \quad \Rightarrow \quad$ normal gradient $= -\frac{1}{\frac{dy}{dx}} = -\frac{1}{-1} = 1$

$(1, 3)$ $m = 1$

$$1(x - 1) = y - 3$$
$$x - 1 + 3 = y$$
$$y = x + 2$$

$m = 1$ $c = 2$

question-experience

25

question-order-group

a012

question-level

1

answer-label

$m =$

answer-value

1

answer-hint

Give integer solution.

answer-label

$c =$

answer-value

2

answer-hint

Give integer solution.

question-text

Find the equation of the tangent of the curve $y = x^3 - 2x^2 - 5$ at $x = -1$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text

At $x = -1$, $y = (-1)^3 - 2(-1)^2 - 5 = -1 - 2 - 5 = -8$

$$\frac{dy}{dx} = 3x^2 - 2 \cdot 2x$$
$$= 3x^2 - 4x$$

At $x = -1$, $\frac{dy}{dx} = 3(-1)^2 - 4(-1) = 3 + 4 = 7 \quad \Rightarrow \quad$ tangent gradient

$(-1, -8)$ $m = 7$

$$7(x-(-1)) = y-(-8)$$
$$7(x+1) = y+8$$
$$7x+7 = y+8$$
$$7x+7-8 = y$$
$$y = 7x-1$$

$m = 7$ $c = -1$

question-experience
30

question-order-group
a013

question-level
1

answer-label
$m =$

answer-value
7

answer-hint
Give integer solution.

answer-label
$c =$

answer-value
-1

answer-hint
Give integer solution.

question-text
Find the equation of the tangent of the curve $y = 2x^3 - 5x + 1$ at $x = -1$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text
At $x = -1$, $y = 2(-1)^3 - 5(-1) + 1 = -2 + 5 + 1 = 4$

$$\frac{dy}{dx} = 2 \cdot 3x^2 - 5$$
$$= 6x^2 - 5$$

At $x = -1$, $\frac{dy}{dx} = 6(-1)^2 - 5 = 6 - 5 = 1$ $\Rightarrow$ tangent gradient

$(-1, 4)$ $m = 1$

$$1(x-(-1)) = y-4$$
$$x+1 = y-4$$
$$x+1+4 = y$$
$$y = x+5$$

$m = 1 \qquad c = 5$

question-experience
30

question-order-group
a013

question-level
1

answer-label
$m =$

answer-value
1/4

answer-hint
Give integer solution.

answer-label
$c =$

answer-value
Inflection Point

answer-hint
Give integer solution.

question-text
Find the equation of the tangent of the curve $y = 3x^3 + 4x^2 - 2$ at $x = -1$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text
At $x = -1, \qquad y = 3(-1)^3 + 4(-1)^2 - 2 = -3 + 4 - 2 = -1$

$$\frac{dy}{dx} = 3 \cdot 3x^2 + 4 \cdot 2x$$
$$= 9x^2 + 8x$$

At $x = -1, \qquad \frac{dy}{dx} = 9(-1)^2 + 8(-1) = 9 - 8 = 1 \quad \Rightarrow \quad$ tangent gradient

$(-1, -1) \qquad m = 1$

$$1(x - (-1)) = y - (-1)$$
$$x + 1 = y + 1$$
$$x + 1 - 1 = y$$
$$y = x$$

$m = 1 \qquad c = 0$

question-experience
30

question-order-group
a013

question-level
1

answer-label

$m =$

answer-value

10=g

answer-hint

Give integer solution.

answer-label

$c =$

answer-value

y¿=16

answer-hint

Give integer solution.

question-text

Find the equation of the normal of the curve $y = x^{-1} + x^2 - 3x$ at $x = 2$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text

At $x = 2$, $\quad y = (2)^{-1} + (2)^2 - 3(2) = \frac{1}{2} + 4 - 6 = -\frac{3}{2}$

$$\frac{dy}{dx} = -1 \cdot x^{-2} + 2x - 3$$
$$= -x^{-2} + 2x - 3$$

At $x = 2$, $\quad \frac{dy}{dx} = -(2)^{-2} + 2(2) - 3 = -\frac{1}{4} + 4 - 3 = \frac{3}{4} \quad \Rightarrow \quad$ normal gradient $= -\frac{1}{\frac{dy}{dx}} = -\frac{1}{\frac{3}{4}} = -\frac{4}{3}$

$\left(2, -\frac{3}{2}\right) \qquad m = -\frac{4}{3}$

$$-\frac{4}{3}(x - 2) = y - \left(-\frac{3}{2}\right)$$
$$\frac{4}{3}(2 - x) = y + \frac{3}{2}$$
$$6 \cdot \frac{4}{3}(2 - x) = 6\left(y + \frac{3}{2}\right)$$
$$8(2 - x) = 6y + 9$$
$$16 - 8x = 6y + 9$$
$$6y = -8x + 7$$
$$y = -\frac{4}{3}x + \frac{7}{6}$$
$$y = -1.33x + 1.17$$

$m = -1.33 \qquad c = 1.17$

question-experience

35

question-order-group

a014

question-level

1

answer-label

$m =$

answer-value

(-1.33, -1/2)

answer-hint

Give integer solution.

answer-label

$c =$

answer-value

Maximum

answer-hint

Give integer solution.

question-text

Find the equation of the normal of the curve $y = 2x^{-1} - 3x^2 + 11x$ at $x = 2$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text

At $x = 2$, $\quad y = 2(2)^{-1} - 3(2)^2 + 11(2) = 2 \cdot \frac{1}{2} - 3 \cdot 4 + 22 = 1 - 12 + 22 = 11$

$$\begin{aligned} \frac{dy}{dx} &= -1 \cdot 2x^{-2} - 3 \cdot 2x + 11 \\ &= -2x^{-2} - 6x + 11 \end{aligned}$$

At $x = 2$, $\quad \frac{dy}{dx} = -2(2)^{-2} - 6(2) + 11 = -2 \cdot \frac{1}{4} - 12 + 11 = -\frac{1}{2} - 1 = -\frac{3}{2} \quad \Rightarrow \quad$ normal gradient $= -\frac{1}{\frac{dy}{dx}} = -\frac{1}{-\frac{3}{2}} = \frac{2}{3}$

$(2, 11) \qquad m = \frac{2}{3}$

$$\begin{aligned} \frac{2}{3}(x - 2) &= y - 11 \\ 2(x - 2) &= 3(y - 11) \\ 2x - 4 &= 3y - 33 \\ 2x - 4 + 33 &= 3y \\ 3y &= 2x + 29 \\ y &= \frac{2}{3}x + \frac{29}{3} \\ y &= 0.67x + 9.67 \end{aligned}$$

$m = 0.67 \qquad c = 9.67$

question-experience

35

question-order-group

a014

question-level

1

answer-label

$m =$

answer-value
0.67

answer-hint
Give integer solution.

answer-label
$c =$

answer-value
9.67

answer-hint
Give integer solution.

question-text
Find the equation of the normal of the curve $y = 4x^{-1} - x^2 + 7x$ at $x = 2$, give it in the form $y = mc + c$ and state the value of m and c.

solution-text
At $x = 2$, $\quad y = 4(2)^{-1} - (2)^2 + 7(2) = 4 \cdot \frac{1}{2} - 4 + 14 = 2 + 10 = 12$

$$\begin{aligned} \frac{dy}{dx} &= 4 \cdot (-1)x^{-2} - 2x + 7 \\ &= -4x^{-2} - 2x + 7 \end{aligned}$$

At $x = 2$, $\quad \frac{dy}{dx} = -4(2)^{-2} - 2(2) + 7 = -4 \cdot \frac{1}{4} - 2(2) + 7 = -1 - 4 + 7 = 2 \quad \Rightarrow \quad$ normal gradient $= -\frac{1}{\frac{dy}{dx}} = -\frac{1}{2}$

$(2, 12) \qquad m = -\frac{1}{2}$

$$\begin{aligned} -\frac{1}{2}(x - 2) &= y - 12 \\ -(x - 2) &= 2(y - 12) \\ 2 - x &= 2y - 24 \\ 2 - x + 24 &= 2y \\ 2y &= -x + 26 \\ y &= -\frac{1}{2}x + 13 \\ y &= -0.5x + 13 \end{aligned}$$

$m = -0.5 \qquad c = 13$

question-experience
35

question-order-group
a014

question-level
1

answer-label
$m =$

answer-value
-0.5

answer-hint
Give integer solution.

answer-label
$c =$

answer-value
13

answer-hint
Give integer solution.