

## إجابات كتاب التمارين

### قاعدة السلسلة

أجد مشتقة كل اقتران مما يأتي:

$$(1) f(x) = 100e^{-0.1x}$$

$$f'(x) = -10e^{-0.1x}$$

$$(2) f(x) = \sin(x^2 + 1)$$

$$f'(x) = 2x \cos(x^2 + 1)$$

$$(3) f(x) = \cos^2 x$$

$$f'(x) = -2 \cos x \sin x = -\sin 2x$$

$$(4) f(x) = \cos 2x - 2 \cos x$$

$$f'(x) = -2 \sin 2x + 2 \sin x$$

$$(5) f(x) = \log_3 xx - 12$$

$$f(x) = \log_3 x + 12 \log_3 (x - 1) - \log_3 2$$

$$f'(x) = 1x \ln 3 + 12(x - 1) \ln 3$$

$$(6) f(x) = 2 \cot^2 (\pi x + 2)$$

$$f(x) = 2(\cot (\pi x + 2))^2$$

$$f'(x) = -4\pi \cot (\pi x + 2) \csc^2 (\pi x + 2)$$

$$(7) f(x) = \log 2x$$

$$f'(x) = 22x \ln 10 = 1x \ln 10$$

$$(8) f(x) = \ln(x^3 + 2)$$

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

$$(9) f(x) = (x^2x^3 + 2)^2$$

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

$$(10) f(x) = x^2 20 - x$$

$$\begin{aligned} f'(x) &= x^2 x - 12 20 - x + 2x 20 - x \\ &= -x^2 20 - x + 2x 20 - x = 80x - 5x^2 20 - x \end{aligned}$$

$$(11) f(x) = \sin(2x + 1)e^{x^2}$$

$$\begin{aligned} f'(x) &= 2e^{x^2} \cos(2x + 1) - 2xe^{x^2} \sin(2x + 1) e^{2x^2} \\ &= 2 \cos(2x + 1) - 2x \sin(2x + 1) e^{x^2} \end{aligned}$$

$$(12) f(x) = 3 \cot x$$

$$f'(x) = - (3 \cot x \ln 3) \csc^2 x$$

x أجد معادلة المماس لكل اقتران مما يأتي عند قيمة المعطاة:

$$(13) y = 2 \sin 5x - 4 \cos 3x, x = \pi/2$$

$$dy/dx = 10 \cos 5x + 12 \sin 3x$$

ميل المماس:

$$dy/dx (x=\pi/2) = -12$$

$x = \pi/2$  عندما ، فإن  $y = 2$

معادلة المماس:

$$y - 2 = -12(x - \pi/2) \rightarrow y = -12x + 6\pi + 2$$

$$(14) f(x) = (x^2 + 2)^3, x = -1$$

$$f'(x) = 6x(x^2 + 2)^2$$

ميل المماس:

$$f'(-1) = -54$$

$$x = -1 \rightarrow y = f(-1) = 27$$

معادلة المماس:

$$y - 27 = -54(x + 1) \rightarrow y = -54x - 27$$

$$(15) f(x) = \tan 3x, x = \pi/4$$

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

ميل المماس:

$$f'(\pi/4) = 6$$

$$x = \pi/4 \rightarrow y = f(\pi/4) = -1$$

معادلة المماس:

$$y + 1 = 6(x - \pi/4) \rightarrow y = 6x - 3\pi/2 - 1$$