

أتدرّب وأحل المسائل

المماس والعمودي على المماس

أجد معادلة المماس لمنحنى كل اقتران ممّا يأتي عند النقطة المعطاة:

$$(1) f(x)=x^3-6x+3, (2, -1)$$

$$f(x)=x^3-6x+3, (2, -1), f(2)=-1, f'(x)=3x^2-6, f'(2)=12-6=6$$

معادلة المماس:

$$y-f(a)=f'(a)(x-a) \Rightarrow y-(-1)=6(x-2) \Rightarrow y+1=6x-12 \Rightarrow y=6x-13$$

$$(2) f(x)=x^4-3x^3, (1, -2)$$

$$f(x)=x^4-3x^3=x^4-x^3-3x^2, (1, -2), f(1)=-2, f'(x)=3x^2-6x, f'(1)=3-6=-3$$

معادلة المماس:

$$y-f(a)=f'(a)(x-a) \Rightarrow y-(-2)=-3(x-1) \Rightarrow y+2=-3x+3 \Rightarrow y=-3x+1$$

$$(3) f(x)=x(x^2-1), (1, 0)$$

$$f(x)=x(x^2-1), (1, 0), f(1)=0, f'(x)=(x)(2x)+(x^2-1)(2x), f'(1)=(1)(2)+(0)(12)=2$$

معادلة المماس:

$$y-f(a)=f'(a)(x-a) \Rightarrow y-0=2(x-1) \Rightarrow y=2x-2$$

$$(4) f(x)=x+4x, (-4, -5)$$

$$f(x)=x+4x, (-4, -5), f(-4)=-5, f'(x)=1-4x^2, f'(-4)=1-4(16)=1-416=1-14=34$$

معادلة المماس:

$$y-f(-4)=f'(-4)(x-(-4)) \Rightarrow y-(-5)=34(x+4) \Rightarrow y+5=34x+3(4) \Rightarrow y=34x-2$$

$$(5) f(x)=x+ex, (0, 1)$$

$$f(x)=x+ex, (0, 1), f(0)=1, f'(x)=1+ex, f'(0)=1+e(0)=1+1=2$$

معادلة المماس:

$$y - f(a) = f'(a)(x - a)$$

$$y - f(0) = f'(0)(x - 0)$$

$$y - 1 = 2(x - 0)$$

$$y - 1 = 2xy = 2x + 1$$

$$(6) \quad f(x) = \ln(x + e), \quad (0, 1)$$

$$f(x) = \ln(x + e), \quad (0, 1), \quad f(0) = 1$$

$$f'(x) = \frac{1}{x+e}$$

$$f'(0) = 1$$

$$1 = 10 + e \Rightarrow e = 10$$

معادلة المماس:

$$y - f(a) = f'(a)(x - a)$$

$$y - f(0) = f'(0)(x - 0)$$

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

$$y - 1 = ex$$

$$y = ex + 1$$

X أجد معادلة المماس لمنحنى كل اقتران مما يأتي عند قيمة المعطاة:

$$(7) \quad f(x) = x - 7, \quad x = 16$$

$$f(x) = x - 7, \quad x = 16$$

$$f(16) = 16 - 7 = 9$$

$$\rightarrow (16, 9)$$

$$f'(x) = 1$$

$$f'(16) = 1$$

معادلة المماس:

$$y - f(a) = f'(a)(x - a)$$

$$y - f(16) = f'(16)(x - 16)$$

$$y - 9 = 1(x - 16)$$

$$y - 9 = x - 16$$

$$y = x - 7$$

$$(8) \quad f(x) = (x - 1)e^x, \quad x = 1$$

$$f(x) = (x - 1)e^x, \quad x = 1$$

$$f(1) = (1 - 1)e^1 = 0$$

$$\rightarrow (1, 0)$$

$$f'(x) = (x - 1)e^x + e^x(1) = xe^x$$

$$f'(1) = 1e^1 = e$$

معادلة المماس:

$$y - f(a) = f'(a)(x - a)$$

$$y - f(1) = f'(1)(x - 1)$$

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

$$y = ex - e$$

$$(9) \quad f(x) = x + 3x - 3, \quad x = 4$$

$$f(x) = x + 3x - 3, \quad x = 4$$

$$f(4) = 4 + 3 \cdot 4 - 3 = 13$$

$$f'(x) = (x - 3)(1) - (x + 3)(1)$$

$$(x - 3)2 = -6(x - 3)$$

$$2f(4) = -6(4 - 3)2 = -6$$

معادلة المماس:

$$y - f(a) = f'(a)(x - a)$$

$$y - f(4) = f'(4)(x - 4)$$

$$y - 13 = -6(x - 4)$$

$$y - 13 = -6x + 24$$

$$y = -6x + 31$$

$$(10) f(x) = (\ln x)^2, x = e$$

$$f(x) = (\ln x)^2, x = e \\ f(e) = (\ln e)^2 = 1 \\ f'(x) = 2(\ln x)(1/x) \\ f'(e) = 2(\ln e)(1/e) = 2/e$$

معادلة المماس:

$$y - f(a) = f'(a)(x - a) \\ y - f(e) = f'(e)(x - e) \\ y - 1 = 2e(x - e) \\ y - 1 = 2ex - 2e^2 \\ y = 2ex - 2e^2 + 1$$