PPP Solutions

1) $f'(x) = -24e^{-3x} - \frac{1}{x}$

2) $f'(x) = \frac{1}{2}(13-8x)^{-\frac{1}{2}}(-8)$

$= \frac{-4}{\sqrt{13-8x}}$

3) $f'(x) = \frac{(4x-7)6 - (6x+1)4}{(4x-7)^2}$

$= \frac{24x - 42 - 24x - 4}{(4x-7)^2} = \frac{-46}{(4x-7)^2}$

4) $g'(x) = \frac{10x^3(+\sin x) - \cos x\,(30x^2)}{(10x^3)^2}$

$g'(x) = \frac{-10x^3\sin x - 30x^2\cos x}{100x^6}$

$g'(x) = \frac{\cancel{10x^3}(-x\sin x - 3\cos x)}{\cancel{100x^6}\ 10x^4}$

$g'(x) = \frac{-x\sin x - 3\cos x}{10x^4}$

5) $y' = 8x^4 \cdot 7e^{7x} + e^{7x} \cdot 32x^3 = \frac{56x^4e^{7x}}{8\,x^3\,e^{7x}} + \frac{32x^3e^{7x}}{8\,x^3\,e^{7x}}$

$8x^3e^{7x}(7x+4)$

6) $f(x) = \cos^{10}(3x+2)$

$f'(x) = 10\cos^9(3x+2) \cdot \underbrace{-\sin(3x+2)\cdot 3}_{\frac{d}{dx}\cos(3x+2)}$

$= -30\cos^9(3x+2)\sin(3x+2)$

7a) $f(x) = (4x^2-3)^3$ at $x = -2$

SLOPE: $f'(x) = 3(4x^2-3)^2 \cdot 8x$

$= 24x(4x^2-3)^2$

POINT: $(-2, f(-2))$

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

EQ: $2197 = -8112(-2) + b$

$b = -14027$

$m = 24(-2)\left(4(-2)^2 - 3\right)^2$

$m = -48 \cdot 13^2$

$m = -8112$

$= 13^3$

$= 2197$

$(-2, 2197)$

$y = -8112x - 14027$

b) $f(x) = 8\ln(x^7)$ at $x = e$

SLOPE: $f'(x) = 8 \cdot \frac{1}{x^7} \cdot 7x^6$

$= \frac{56}{x}$

$m = \frac{56}{e}$

POINT: $(e, f(e))$

$f(e) = 8\ln e^7$

$= 8 \cdot 7$

$= 56$

$(e, 56)$

EQ: $56 = \frac{56}{e}e + b$

$56 = 56 + b$

$0 = b$

$y = \frac{56}{e}x$

$f(x) = \ln x - 8e^{-5x} + \sqrt{2}^{2\pi}$

$f'(x) = \frac{1}{x} + 40e^{-5x}$

$g(x) = \sqrt{x^2 - 5}$

$g(x) = (x^2 - 5)^{1/2}$

$g'(x) = \frac{1}{2}(x^2 - 5)^{-\frac{1}{2}} \cdot 2x$

$g'(x) = \frac{x}{\sqrt{x^2 - 5}}$

$y = \frac{7 + 5x}{8 - 7x}$

$y' = \frac{(8 - 7x)5 - (7 + 5x)(-7)}{(8 - 7x)^2}$

$f(x) = \frac{\sin x}{6x^4}$

$f'(x) = \frac{6x^4 \cdot \cos x - \sin x \cdot 24x^3}{(6x^4)^2}$

$$y' = \frac{40 - 35x + 49 - 35x}{(8-7x)^2}$$

$$y' = \frac{89}{(8-7x)^2}$$

$$f'(x) = \frac{6x^4\cos x - 24x^3\sin x}{36x^8}$$

$$f'(x) = \frac{6x^3(x\cos x - 4\sin x)}{36x^8}$$

$$\frac{6x^5}{}$$

$$f'(x) = \frac{x\cos x - 4\sin x}{6x^5}$$

$$f(x) = \frac{\cos x}{2x^8}$$

$$f'(x) = \frac{2x^8(-1\sin x) - \cos x(16x^7)}{(2x^8)^2}$$

$$f'(x) = \frac{-2x^8\sin x - 16x^7\cos x}{4x^{16}}$$

$$f'(x) = \frac{2x^7(-x\sin x - 8\cos x)}{4x^{16}}$$

$$\frac{2x^9}{}$$

$$f'(x) = \frac{-x\sin x - 8\cos x}{2x^9}$$

$y = 10x^2 e^{13x}$

$y' = 10x^2 \cdot 13e^{13x} + e^{13x} \cdot 20x$

$y' = \frac{130x^2 e^{13x}}{10\ x\ e^{13x}} + \frac{20x e^{13x}}{10x\ e^{13x}}$

$y' = 10x e^{13x}(13x + 2)$

$h(x) = \sin^3(x^2-2)$

$h'(x) = 3\sin^2(x^2-2) \cdot \underbrace{\cos(x^2-2) \cdot 2x}_{\frac{d}{dx}\sin(x^2-2)}$

$h'(x) = 6x \sin^2(x^2-2)\cos(x^2-2)$

Eq. of tan line to

$y = (2x^2-1)^3$ at $x = -1$

SLOPE: $y' = 3(2x^2-1)^2 \cdot 4x$

$y' = 12x(2x^2-1)^2$

$m = y' = \underbrace{12(-1)}(2(-1)^2-1)^2$

$= -12 \cdot 1^2$

$m = -12$

POINT: $y = (2(-1)^2-1)^3$

$y = 1^3 = 1$

$(-1, 1)$

EQ: $1 = -12(-1) + b$

$-11 = b$

$y = -12x - 11$

$y = -3\ln(x^4)$ at $x = e^2$

SLOPE: $y' = -3 \cdot \frac{1}{x^4} \cdot \frac{4x^3}{1} = -\frac{12}{x}$

$m = -\frac{12}{e^2}$

POINT: $y = -3\ln((e^2)^4)$

$y = -3 \cdot \ln e^8$

$y = -3 \cdot 8 = -24$

$(e^2, -24)$

$-24 = -\frac{12}{e^2} \cdot e^2 + b$

$-12 = b$

$y = -\frac{12}{e^2}x - 12$

Eq of tan line to $y = 5\ln(x^{10})$ at $x = e$

SLOPE:

$y' = 5 \cdot \frac{1}{x^{10}} \cdot \frac{10x^{9}}{1}$

$= \frac{50}{x}$

$m = \frac{50}{e}$

POINT: $5\ln(e^{10})$

$5 \cdot 10$

50

$(e, 50)$

EQ: $50 = \frac{50}{e} \cdot e + b$

$0 = b$

$y = \frac{50}{e}x$