

$$8) f(x) = -6 \ln x + 11x^2 - 6$$

$$f'(x) = -6 \cdot \frac{1}{x} + 11 \cdot 2x$$

$$9) \text{ Find } dy \text{ for } y = \frac{5x^2 + 7}{x^2}$$

$$f'(x) = \frac{5x^2}{x^2} + \frac{7}{x^2}$$

$$f'(x) = 5 + 7x^{-2}$$

$$f'(x) = 0 + 7(-2)x^{-3}$$

$$dy = -14x^{-3} dx$$

$$11) \text{ derivative of } x \text{ of } f(x) = \ln x^7$$

$$\frac{7}{x}$$

$$12) f(x) = \frac{7x+7}{3x-7}$$

$$f(10) = 3.348$$

$$f(100) = 2.413$$

$$\lim_{x \rightarrow \infty} \frac{7x+7}{3x-7} \quad \text{same degrees}$$

$$\frac{7}{3} = 2.333$$

$$13) f(x) = \ln x^{10} + 5 \ln x$$

$$= \frac{10}{x} + \frac{5}{x}$$

$$\frac{15}{x}$$

$$14) \text{ equation of tangent line}$$

$$f(x) = 2 - 9 \ln x; x=1$$

$$f'(x) = -9x + 11 = 4 \ln x$$

$$15) f(x) = \ln x^4; x = e^5$$

$$f'(x) = \frac{4}{x} \quad m = \frac{4}{e^5}$$

$$y = \frac{4}{e^5} x + b$$

$$f(e^5) = 4 \log_e e^5 = 4 \cdot 5 = 20$$

$$20 = \frac{4}{e^5} e^5 + b$$

$$20 = 4 + b$$

$$16 = b$$

$$y = \frac{4}{e^5} x + 16$$

16) $f(x) = e^x$ at $x=3.5$ through $(2.5, 0)$.

Is the distance always 1?

Yes, it will pass through because it's the same line.

17) $g(x) = \ln x$ at $x=3$ through $(0, 0)$.

does not pass through

no, will not, different line

18) $f(x) = 17x + \ln 17x$

$$f(x) = 17x + \ln 17 + \ln x$$

$$f'(x) = 17 + 0 + \frac{1}{x}$$

19) $f(x) = e^x$ $x=4.5$

$$f'(x) = e^x = e^{4.5} = m$$

$$y = e^{4.5}x + b$$

$$e^{4.5} = e^{4.5}(4.5) + b$$

$$-3.5 \cdot e^{4.5} = b$$

$$y = e^{4.5} - 3.5e^{4.5}$$

plug in the y value and

Solve to see if you get correct
 x value.

19) $f(x) = 2 \ln\left(\frac{5}{x}\right)$

$$f'(x) = 2(\ln 5 - \ln x)$$

$$f'(x) = 2\left(0 - \frac{1}{x}\right)$$

$$f'(x) = 2\left(-\frac{1}{x}\right)$$

$$f'(x) = -\frac{2}{x}$$

20) Find $\frac{dy}{dx}$

$$y = 2 \log_7 x$$

$$\frac{dy}{dx} = \frac{2 \ln x}{\ln 7} \rightarrow \frac{2}{\ln 7} \cdot \frac{1}{x}$$

$$21) \frac{dy}{dx} y = 2^x$$

natural log of base multiplied
by the function.

$$= \frac{dy}{dx} \ln 2 \cdot 2^x$$

$$3^x \rightarrow 3^x \text{ (not)}$$

$$x^3 \rightarrow 3x^2 \text{ only do when power is a number}$$

$$26) P(x) = 13.8(7 + \ln x) \quad 10 \leq x \leq 100$$

take derivative then plug in

$$P'(x) = \frac{13.8}{x}$$

$$\frac{13.8}{70}$$

$$\frac{13.8}{50}$$

$$= 0.28$$

$$= 0.2$$