3-0235 — 50 SHEETS — 5 SQUARES
3-0236 — 100 SHEETS — 5 SQUARES
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET

28) $f(x) = \dfrac{1}{1+\ln x}$

$$f'(x) = \frac{(1+\ln x)(1)' - (1)(1+\ln x)'}{(1+\ln x)^2}$$

$$= \frac{-\frac{1}{x}}{(1+\ln x)^2}$$

$$f'(x) = -\frac{1}{x(1+\ln x)^2}$$

same as $\ln x \neq -1$

Domain $f = \{x \mid x>0 \text{ and } x \neq \frac{1}{e}\}$

33) Find equation of tangent to curve

$y = \ln(xe^{x^2})$ at $(1,1)$

$$y' = \frac{(xe^{x^2})'}{xe^{x^2}} = \frac{e^{x^2} + xe^{x^2}(2x)}{xe^{x^2}}$$

$$= \frac{e^{x^2}(1+2x^2)}{xe^{x^2}}$$

$$\boxed{y' = \frac{1+2x^2}{x} = \frac{1}{x} + 2x}$$

$\therefore y'(1) = 3$

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

$\boxed{y = 3x - 2}$

* Alternatively, y' can be found using laws of logs *

$y = \ln(xe^{x^2})$

$= \ln x + x^2 \ln e$

$y = \ln x + x^2$

$\boxed{y' = \frac{1}{x} + 2x}$ $\quad y'(1) = \frac{1}{1} + 2\cdot 1 = 3$

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37) Use logarithmic differentiation

$$y = (2x+1)^5 (x^4-3)^6$$

$$\ln y = 5\ln(2x+1) + 6\ln(x^4-3)$$

differentiate both sides w.r.t. x

$$\frac{1}{y}\frac{dy}{dx} = \frac{5\cdot 2}{2x+1} + \frac{6\cdot 4x^3}{x^4-3}$$

$$\frac{dy}{dx} = y\left(\frac{10}{2x+1} + \frac{24x^3}{x^4-3}\right)$$

$$\boxed{\frac{dy}{dx} = (2x+1)^5(x^4-3)^6\left(\frac{10}{2x+1} + \frac{24x^3}{x^4-3}\right)}$$

41) Use logarithmic differentiation to find y' if

$$y = x^x$$

$$\ln y = x\ln x$$

$$\frac{1}{y}y' = \ln x + 1$$

$$y' = y(\ln x + 1)$$

$$\boxed{y' = x^x(\ln x + 1)}$$

45) Use logarithmic differentiation to find y' if

$$y = (\cos x)^x$$

$$\ln y = x\ln(\cos x)$$

$$\frac{y'}{y} = \ln(\cos x) + \frac{x\cdot(-\sin x)}{\cos x}$$

$$y' = y\left(\ln(\cos x) - \frac{x\sin x}{\cos x}\right)$$

$$\boxed{y' = (\cos x)^x(\ln\cos x - x\tan x)}$$