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

Homework 45 | 20, 31, 33, 46, 52, 59

20) $\lim_{x\to 1} \frac{\ln x}{\sin \pi x} = \frac{0}{0}$ L'Hospital's Rule applies

$\overset{H}{=} \lim_{x\to 1} \frac{\frac{1}{x}}{\pi \cos \pi x} = \lim_{x\to 1} \frac{1}{\pi x \cos \pi x} = \frac{1}{\pi \cos \pi} = -\frac{1}{\pi}$

31) $\lim_{x\to 0} \frac{x+\sin x}{x+\cos x} = \frac{0+0}{0+1} = \frac{0}{1} = 0$ L'Hospital's Rule does not apply

33) $\lim_{x\to 1} \frac{1-x+\ln x}{1+\cos \pi x} = \frac{0}{1-1} = \frac{0}{0}$ L'Hospital's Rule applies

$\overset{H}{=} \lim_{x\to 1} \frac{-1+\frac{1}{x}}{-\pi \sin \pi x} = \frac{0}{0}$ Apply L'Hospital's Rule again

$\overset{H}{=} \lim_{x\to 1} \frac{-\frac{1}{x^2}}{-\pi^2 \cos \pi x} = \frac{-1}{\pi^2}$

46) $\lim_{x\to \infty} x \tan \frac{1}{x} = \infty \cdot 0$ Indeterminate Product

$= \lim_{x\to \infty} \frac{\tan \frac{1}{x}}{\frac{1}{x}} = \frac{0}{0}$ L'Hospital's Rule applies

$\overset{H}{=} \lim_{x\to \infty} \frac{-\frac{1}{x^2} \sec^2(\frac{1}{x})}{-\frac{1}{x^2}} = \lim_{x\to \infty} \sec^2(\frac{1}{x}) = \sec^2(0) = 1^2 = 1$

52) $\lim_{x\to \infty} (xe^{1/x} - x) = \infty - \infty$ Indeterminate Difference

$= \lim_{x\to \infty} x(e^{1/x} - 1) = \infty \cdot 0$ Indeterminate Product

$= \lim_{x\to \infty} \frac{e^{1/x}-1}{1/x} = \frac{0}{0}$ L'Hospital's Rule applies

$\overset{H}{=} \lim_{x\to \infty} \frac{-\frac{1}{x^2} e^{1/x}}{-\frac{1}{x^2}} = \lim_{x\to \infty} e^{1/x} = e^0 = 1$

59) $\lim_{x\to \infty} x^{1/x} = \infty^0$ Indeterminate Powers

$y = x^{1/x} \to \ln y = \frac{1}{x} \ln x \to \lim_{x\to \infty} \frac{1}{x} \ln x = 0 \cdot \infty$ Indeterminate Product

$= \lim_{x\to \infty} \frac{\ln x}{x} = \frac{\infty}{\infty}$ L'Hospital's Rule applies

$\overset{H}{=} \lim_{x\to \infty} \frac{\frac{1}{x}}{1} = \lim_{x\to \infty} \frac{1}{x} = 0$. Since $\lim_{x\to \infty} \ln y = 0$, $\lim_{x\to \infty} y = e^0 = 1$ where $y = x^{1/x}$