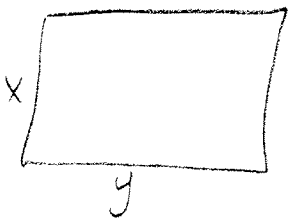
4.5 #30 $\lim_{x\to 0^+} (\sin x)\ln x = \lim_{x\to 0^+} \frac{\sin x}{x} \cdot x \cdot \ln x$ ($\frac{\sin x}{x} \to 1$)

$= \lim_{x\to 0^+} x\cdot\ln x = 0\cdot -\infty$

$= \lim_{x\to 0^+} \frac{\ln x}{\frac{1}{x}} = \frac{-\infty}{\infty} \Rightarrow \lim_{x\to 0^+} \frac{\frac{1}{x}}{-1\cdot x^{-2}} = -x = \underline{0}$

4.6 #18



given $P = 2x + 2y \Rightarrow \frac{P-2x}{2} = y$

max $x\cdot y$

max $A(x) = \frac{Px}{2} - x^2$

$A'(x) = \frac{P}{2} - 2x$ $\quad A'(x) = 0$

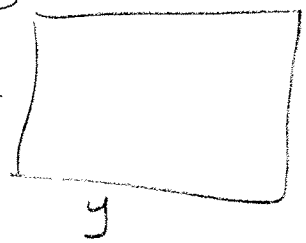
$\frac{P}{2} = 2x$

$x = \frac{P}{4}$ $\quad y = \frac{P}{4}$ ∴ square

$A'(x)$: + on $\left(0, \frac{P}{4}\right)$, − on $\left(\frac{P}{4}, \frac{P}{2}\right)$

∴ rel max

1.6 #15



given $A = x\cdot y \Rightarrow \frac{A}{x} = y$

min $2x + 2y$

$P(x) = 2x + \frac{2A}{x}$

$P'(x) = 2 + 2A\cdot -1\cdot x^{-2}$

$= \frac{2x^2 - 2A}{x^2}$

$P'(x) = 0$

$2x^2 = 2A$

$x^2 = A$

$x = \sqrt{A} \Rightarrow y = \sqrt{A}$ ∴ square

$P'(x)$: − on $(0, \sqrt{A})$, + on $(\sqrt{A}, \infty)$

∴ rel min