

ANthon VALENTINE . O.
 TECHNICAL ENGINEERING
 16/ENG06/DMH

1a) Evaluate $\lim_{x \rightarrow \pi/2} \left[\frac{x^2 - \frac{\pi}{4} \sin(\cos x)}{x - \frac{\pi}{2}} \right]$
 $= \frac{(\pi/2)^2 - \frac{\pi}{4} \sin(\cos(\pi/2))}{\pi/2 - \pi/2} = \frac{0}{0}$ Undefined.

$\lim_{x \rightarrow \pi/2} \left[\frac{(2x-0) (\sin(-\sin x) + \cos 2x \cos x)}{2 \left(\frac{\pi}{2} \right) - \frac{\pi}{2}} \right]$
 $= \frac{1-0}{1} = 1$
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$\lim_{x \rightarrow \pi/2} \left[\frac{x^2 - \frac{\pi}{4} \sin(\cos x)}{x - \frac{\pi}{2}} \right] = -\pi$
 $= \pi(-1+0)$
 $= \pi(-1)$

b) $\lim_{x \rightarrow \pi/2} \ln \left[\frac{\exp(3x^2 + 2x - 1)}{x+1} \right]$

$\lim_{x \rightarrow \pi/2} \ln \left[\frac{(3x-1)(x+1)}{x+1} \right]$
 $= \ln \left(\frac{3(\pi/2) - 1}{\pi/2 + 1} \right)$
 $= \ln \left(\frac{3\pi/2 - 1}{\pi/2 + 1} \right)$

$\lim_{x \rightarrow \pi/2} \ln \left[\frac{\exp(3x^2 + 2x - 1)}{x+1} \right] = \frac{3\pi - 2}{2}$

c) $\lim_{x \rightarrow 2+\sqrt{3}} \cos \left[\frac{\sin^{-1} \left(\frac{x-2}{x-\sqrt{3}} \right)}{\cos \left[\frac{2+\sqrt{3}-2}{2+\sqrt{3}-\sqrt{3}} \right]} \right]$

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$\lim_{x \rightarrow 2+\sqrt{3}} \cos \left[\frac{\sin^{-1} \left(\frac{x-2}{x-\sqrt{3}} \right)}{\cos \left[\frac{2+\sqrt{3}-2}{2+\sqrt{3}-\sqrt{3}} \right]} \right] = \cos 60 = \frac{1}{2}$