 Name: SOLUTIONS

(1) [5] Find $\frac{dy}{dx}$ by implicit differentiation:

$$\tan(x/y) = x + y$$

$$\frac{d}{dx}\left[\tan\left(\frac{x}{y}\right)\right] = \frac{d}{dx}[x+y]$$

$$\sec^2\left(\frac{x}{y}\right)\left(\frac{y - xy'}{y^2}\right) = 1 + y'$$

$$y\sec^2\left(\frac{x}{y}\right) - x\sec^2\left(\frac{x}{y}\right)y' = y^2 + y^2y'$$

$$y'\left[-x\sec^2\left(\frac{x}{y}\right) - y^2\right] = y^2 - y\sec^2\left(\frac{x}{y}\right)$$

$$\boxed{y' = \frac{y\sec^2\left(\frac{x}{y}\right) - y^2}{x\sec^2\left(\frac{x}{y}\right) + y^2}}$$

(2) [5] Find the limit:

$$\lim_{x \to 2^+} e^{3/(2-x)}$$

As $x \to 2^+$, $2-x \to 0^-$,

so $\frac{3}{2-x} \to -\infty$,

so $e^{3/(2-x)} \to 0$

$\therefore \lim_{x \to 2^+} e^{\frac{3}{2-x}} = \boxed{0}$.

(3) [5] Differentiate:

$$y = e^{x \cos x}$$

$$\boxed{y' = e^{x\cos x}\left[\cos x - x \sin x\right].}$$