uid-20BCS4643

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Q. Expand $\sin(x, y)$ in power of $(x-1)$ & $(y-\pi/2)$ as far as terms of 2 degrees

$$f(x,y) = \sin(xy)$$

$$f(x-1+1,\ y-\tfrac{\pi}{2}+\tfrac{\pi}{2}) = f(x,y) = \sin(x,y)$$

so $x = 1$, $y = \frac{\pi}{2}$

According to taylor's theorm -

$$f(x,y) = f(1,\tfrac{\pi}{2}) + \left[(x-1)\, f_x(1,\tfrac{\pi}{2}) + (y-\tfrac{\pi}{2}) \right.$$

$$f_y(1,\tfrac{\pi}{2}) + \frac{1}{2!}\Big(f_{xx}(1,\tfrac{\pi}{2})\,(x-1) + (y-\tfrac{\pi}{2})$$

$$\left. f_{yy}(1,\tfrac{\pi}{2})\Big) \right] + \dots\dots\dots \infty$$

		$x=1$ $\pi/2 = y$
$f(x,y)$	$= \sin(xy)$	
$f(x,y)$	$= \sin(xy)$	1
f_x	$= \cos xy$	0
f_y	$= -\sin(xy)$	-1
f_{xx}	$= -\cos xy$	0
f_{xy}	$= +\sin xy$	1
f_{yy}	$= \cos xy$	1

$$f(x,y) = f(1,\tfrac{\pi}{2}) + \left((x-1)\, f_x(1,\tfrac{\pi}{2}) + (y-\tfrac{\pi}{2})\, f_y \right.$$

$$(1,\pi/2) + \frac{1}{2!}\Big[f_{xx}(1,\tfrac{\pi}{2})\,(x-1) + (y-\tfrac{\pi}{2})$$

$$f_{yy}(1,\tfrac{\pi}{2}) + \dots\dots \infty$$

$$f(x,y) = 1 + \left[(x-1)\,0 + \left(y - \frac{\pi}{2}\right)(-1) \right] + \frac{1}{2!} \left[(x-1)(0) + \left(y - \frac{\pi}{2}\right)(1) \right] + \ldots\ldots \infty$$

$$f(x,y) = 1 + \left[0 + \left(y - \frac{\pi}{2}\right) \right] + \frac{1}{2!} \left[y - \frac{\pi}{2} \right] + \ldots\ldots \infty$$

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