Demostreu que la corba $y = x\sin x$ és tangent a la recta $y = x$ quan $\sin x = 1$. I és tangent a la recta $y = -x$ quan $\sin x = -1$

Solució:
a)
$\sin x = 1$ quan $x = \frac{\pi}{2} + 2\pi k,\ k \in \mathbb{Z}$

Siga $f(x) = x\sin x$
$$f\left(\frac{\pi}{2} + 2\pi k\right) = \left(\frac{\pi}{2} + 2\pi k\right)\sin\left(\frac{\pi}{2} + 2\pi k\right) = \frac{\pi}{2} + 2\pi k$$

$f'(x) = \sin x + x\cos x.$

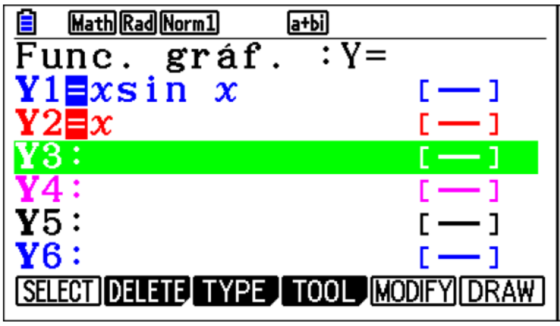
El pendent de la corba quan $x = \frac{\pi}{2} + 2\pi k,\ k \in \mathbb{Z}$ és:
$$f'\left(\frac{\pi}{2} + 2\pi k\right) = \sin\left(\frac{\pi}{2} + 2\pi k\right) + \left(\frac{\pi}{2} + 2\pi k\right)\cos\left(\frac{\pi}{2} + 2\pi k\right) = 1 + 0 = 1$$
L'equació de la recta tangent quan $x = \frac{\pi}{2} + 2\pi k,\ k \in \mathbb{Z}$
$$r_T \equiv y - \left(\frac{\pi}{2} + 2\pi k\right) = 1\left(x - \left(\frac{\pi}{2} + 2\pi k\right)\right)$$
Simplificant:
$r_T \equiv y = x$

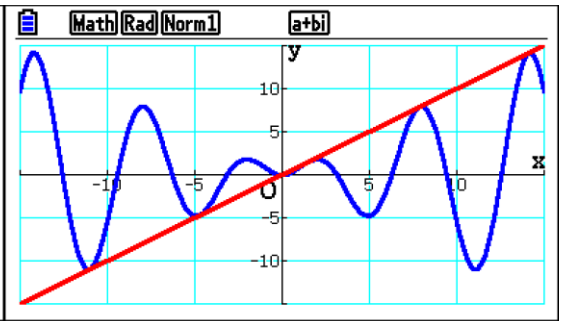
b)
$\sin x = -1$ quan $x = \frac{3\pi}{2} + 2\pi k,\ k \in \mathbb{Z}$

$$f\left(\frac{3\pi}{2} + 2\pi k\right) = \left(\frac{3\pi}{2} + 2\pi k\right)\sin\left(\frac{3\pi}{2} + 2\pi k\right) = -\left(\frac{3\pi}{2} + 2\pi k\right)$$

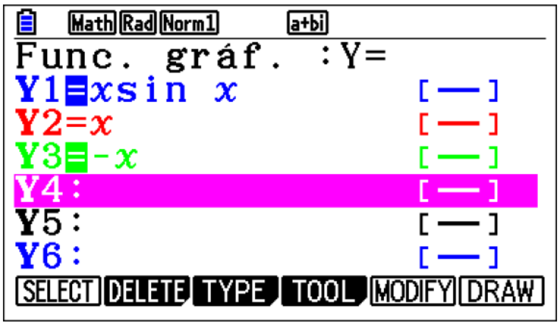
El pendent de la corba quan $x = \frac{3\pi}{2} + 2\pi k,\ k \in \mathbb{Z}$ és:
$$f'\left(\frac{3\pi}{2} + 2\pi k\right) = \sin\left(\frac{3\pi}{2} + 2\pi k\right) + \left(\frac{3\pi}{2} + 2\pi k\right)\cos\left(\frac{3\pi}{2} + 2\pi k\right) = -1 + 0 = -1$$
L'equació de la recta tangent quan $x = \frac{3\pi}{2} + 2\pi k,\ k \in \mathbb{Z}$
$$r_T \equiv y + \left(\frac{3\pi}{2} + 2\pi k\right) = -1\left(x - \left(\frac{3\pi}{2} + 2\pi k\right)\right)$$
Simplificant:
$s_T \equiv y = -x$

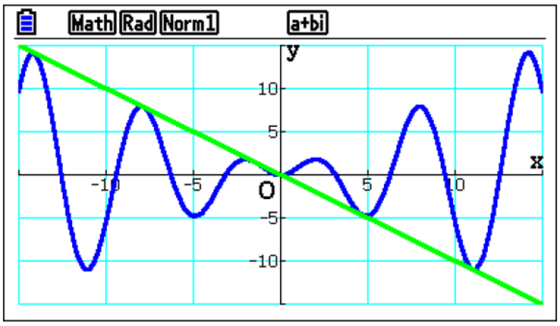
Obrim el *Menú Gráfico*.
Definim i representem $f(x) = x\sin x$ i $r_T \equiv y = x$





Definim i representem $f(x) = x\sin x$ i $s_T \equiv y = -x$





Ampliem la gràfica de les funcions al voltant de $x = \frac{\pi}{2}$