(a) $\frac{f(\pi)-f(0)}{\pi-0} = \frac{e^{\pi}\cos\pi - e^{0}\cos 0}{\pi -}$ → for practice → $-e^{\pi}-1$

↓ this is fine as final answer (FRQ)

5. Let f be the function defined by $f(x) = e^x \cos x$.

(a) Find the average rate of change of f on the interval $0 \le x \le \pi$.

$\frac{y_2-y_1}{x_2-x_1}$

(b) What is the slope of the line tangent to the graph of f at $x = \frac{3\pi}{2}$?

derivative

$f'(x) = e^x(-\sin x) + e^x \cos x$

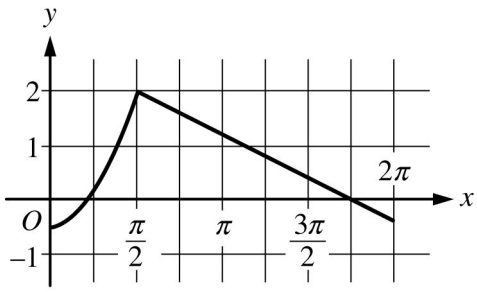
$f'\left(\frac{3\pi}{2}\right) = e^{\frac{3\pi}{2}}\left(-\sin\frac{3\pi}{2}\right) + e^{\frac{3\pi}{2}}\cos\frac{3\pi}{2}$

For practice $e^{\frac{3\pi}{2}}$

(c) Find the absolute minimum value of f on the interval $0 \le x \le 2\pi$. Justify your answer.

endpts and critical pts

(d) Let g be a differentiable function such that $g\left(\frac{\pi}{2}\right) = 0$. The graph of g', the derivative of g, is shown below. Find the value of $\lim_{x\to\pi/2} \frac{f(x)}{g(x)}$ or state that it does not exist. Justify your answer.



Graph of g'

(c) $f'(x) = 0$

$e^x(-\sin x) + e^x \cos x = 0$

$e^x(-\sin x + \cos x) = 0$

e^x doesn't $= 0$

$-\sin x + \cos x = 0$

$\cos x = \sin x$

x	$f(x) = e^x \cos x$
0	1
$\pi/4$	$e^{\pi/4}\cos\frac{\pi}{4}$
$5\pi/4$	$e^{5\pi/4}\cos\frac{5\pi}{4}$ ← this is the only negative value
2π	$e^{2\pi}$

(d) $\lim_{x\to\frac{\pi}{2}} \frac{f(x)}{g(x)}$

$\lim_{x\to\frac{\pi}{2}} f(x) = 0$

$\lim_{x\to\frac{\pi}{2}} g(x) = 0$

L'Hospital's

$\lim_{x\to\frac{\pi}{2}} \frac{f(x)}{g(x)} = \lim_{x\to\frac{\pi}{2}} \frac{f'(x)}{g'(x)} = \frac{-e^{\frac{\pi}{2}}}{2}$