Name: ANSWERS Lehman ID: _____

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MAT176 (Spring 2019)
Quiz 1

1. **(5 pts)** Compute the indefinite integral $\int x\sin(2x)\,dx$.

$$\int x\sin(2x)\,dx = -\frac{x}{2}\cos 2x + \frac{1}{2}\int \cos(2x)\,dx$$

Parts:
$u = x \qquad v = -\frac{1}{2}\cos(2x)$
$du = dx \qquad dv = \sin 2x\,dx$

$$= -\frac{x}{2}\cos 2x + \frac{1}{2}\,\frac{\sin 2x}{2} + C$$

$$= -\frac{x\cos 2x}{2} + \frac{\sin 2x}{4} + C$$

2. **(5 pts)** Find the area under the graph of $f(x) = \dfrac{e^x + \cos(x)}{e^x + \sin(x)}$ between $x = 0$ and $x = \pi$.

$$\text{area under graph} = \int_0^{\pi} \frac{e^x + \cos x}{e^x + \sin x}\,dx = \int_1^{e^{\pi}} \frac{du}{u} = (\ln|u|)\Big|_1^{e^{\pi}}$$

$u = e^x + \sin x$
$du = (e^x + \cos x)\,dx$
$x = 0 \rightsquigarrow u = 1$
$x = \pi \rightsquigarrow u = e^{\pi}$

$$= \ln e^{\pi} - \ln 1$$

$$= \pi$$