DEFINITE INTEGRALS INVOLVING TRIGONOMETRIC FUNCTIONS

1 Sketch the graph of $f(x) = 1 - \cos x$, $0 \le x \le \pi$. Evaluate $\int_0^\pi f(x)\,dx$ and indicate on the sketch the area represented by this integral. What is the exact value of this area?

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2 Evaluate: **(a)** $\int_0^\pi \sin x \, dx$ **(b)** $\int_0^{\frac{\pi}{3}} \sec^2 x \, dx$ **(c)** $\int_{\frac{\pi}{3}}^\pi \cos \frac{x}{2} \, dx$ **(d)** $\int_0^{\frac{\pi}{2}} \cos x \, dx$

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(j) $\displaystyle\int_0^\pi \left(\sin\tfrac{x}{4} + \cos\tfrac{x}{4}\right) dx$

(k) $\displaystyle\int_0^{\frac{\pi}{3}} \left(3\cos 3x - \frac{\sin 2x}{2}\right) dx$

(l) $\displaystyle\int_{-\pi}^{\pi} \left(\frac{\sin x}{2} - \cos x\right) dx$

10 Find the points of intersection of the curves $y = \sin\theta$ and $y = \cos\theta$ for $0 \leq \theta \leq 2\pi$ and calculate the area between the two curves.