King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics

Math 605 Homework # 2

Problem 1 *Find an asymptotic approximation as $x \to \infty$ of the following integral,*

$$I(x) = \int_0^{\frac{\pi}{2}} e^{x \cos t} \ln (\lambda + \sin t) \, dt$$

λ being a real number.

Problem 2 *Find an asymptotic approximation as $x \to \infty$ of the following integral,*

$$I(x) = \int_0^T f(t) e^{x\phi(t)} dt$$

where ϕ has a global maximum at $t = c \in (0, T)$, $\phi'(c) = 0$, $\phi''(c) < 0$ and $f(c) = f'(c) = ... = f^{(n-1)}(c) = 0$, $f^{(n)}(c) \neq 0$.