Phys604/F15/Hassam/Problem Set 5 **Due 10/13/15**

Arfken, Weber, Harris, 7th Ed
Chapter 11:

8.20 (equivalently, deform the contour)

8.22 (assume *n* is an integer)

8.25 (modified to $I = \int dx\, f(x)$, where $f(x) = \exp(bx)\,[\cosh(x)]^{-1}$, and the integral runs from $x=-\infty$ to $x=+\infty$.)

14.6.2 use Laplace's method on the real x-axis only. Leading order only.

Other

5.1 Find, by Laplace's method, the asymptotic value of

$$I(x) = \int dt \exp(-x \sin^2 t)$$

for $x \to +\infty$, *correct to 2nd non-vanishing term in the asymptotic series.* The integral runs from zero to Pi/2.

5.2 The factorial function is defined as $\nu! = \int dx\, x^{\nu} e^{-x}$, where the integral goes from zero to +infinity.

(a) Rewrite the integral in the new variable $t = x/\nu$. Show that the resulting integral is in "standard form" to use for Laplace's method.
(b) Find the leading order asymptotic value of this function for ν real and large.