**Introduction to Asymptotic Methods**

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**Sheet 10**

**Exercise 27**  
Find the leading term of the asymptotic expansion for the Bessel function $J_n(x)$, defined by the integral  
\[
J_n(x) = \frac{1}{2\pi i} \int_{|z|=1} e^{\frac{x}{2}(z-\frac{1}{z})} \frac{dz}{z^{n+1}},
\]
for large and positive values of $x$.  

(2 Points)

**Exercise 28**  
Find the asymptotic behavior for the function $F(x)$ defined as  
\[
F(x) = \int_{-\infty}^{\infty} e^{ixz} \frac{dz}{(1 + z^2)^x}
\]
for large and positive values of $x$.  

(2 Points)

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