Maple Project 9

Directions: This project is due in class on Monday, July 26 1999 and will be attached to Quiz 9. Please prepare your project by modifying the appropriate instructor-provided worksheet.

1. Compute the Laplace transform of the function \( f(t) = \sin(bt) \), and call it \( F(s) \).

2. You have learned that

\[
\mathcal{L}\{ tf(t) \}(s) = -\frac{d}{ds} (\mathcal{L}\{f\}(s)).
\]

Use Maple to compute \(-\frac{d}{ds}(F(s))\). The formula above then shows that the result is the Laplace transform of \( g(t) = t \sin(bt) \).

3. Now, use Maple to compute the Laplace transform of \( g(t) \) directly. Compare the two solutions. Explain any difference between Maple's answer and the previous computation.

4. Compute the Laplace transform of the function \( f(t) = t^2 \sin(bt) \).

5. Compute the Laplace transform of the function \( f(t) = t^3 \sin(bt) \).

6. Compute the Laplace transform of the function \( f(t) = t^4 \sin(bt) \).

7. Can you guess the Laplace transform of the function \( f(t) = t^n \sin(bt) \), for \( n \) arbitrary, using the previous questions? What is it?