Problem Set 3  Differential Equations  Due 3/13/06

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each natural numbered problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

\[ \mathcal{L}(y(t)) = \int_0^\infty y(t)e^{-st} \, dt \]

1. Let \( y(t) = 1 \). Find \( \mathcal{L}(y(t)) \).

2. Let \( y(t) = e^{3t} \). Find \( \mathcal{L}(y(t)) \) for \( s > 3 \). Why does the restriction matter?

3. Let \( y(t) = e^{at} \). Find \( \mathcal{L}(y(t)) \) for \( s > a \). Why does the restriction matter?

4. Let \( y(t) = 1 \). Find \( \mathcal{L}(y(t)) \) again, this time cleverly using your result from problem 1.

5. Show that \( \mathcal{L} \left( \frac{dy}{dt} \right) = s \mathcal{L}(y) - y(0) \).

6. Find \( \mathcal{L}(\cos \omega t) \).

7. Find \( \mathcal{L}(\sin \omega t) \).
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\( \frac{\sqrt{2}}{4} \). Let \( y(t) = 1 \). Find \( \mathcal{L}(y(t)) \).

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$L(y(t)) = \int_{0}^{\infty} y(t)e^{-st} dt$

4. Let $y(t) = 1$. Find $L(y(t))$.

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