> The majority of the credit you receive will be based on the completeness and the clarity of your responses. Please use equal signs where appropriate and write solutions with a logical flow. Show your work, and avoid saying things that are untrue, ambiguous, or nonsensical.

1. Using the definition of the Laplace transform, determine the Laplace transforms of the following:

   (a) $e^{2t}\cos(3t)$

   (b) $e^{-t}\sin(2t)$

   (c)

$$f(x) = \begin{cases} e^{2t}, & 0 < t < 3 \\ 1, & 3 < t \end{cases}$$

2. Use the Laplace transform table, the linearity of the Laplace transform, and any properties or theorems about Laplace Transforms to determine the Laplace Transforms for following transforms.

   (a) $f(t) = 6e^{-3t} - t^2 + 2t - 8$

   (b) $g(t) = t^3 - te^t + e^{4t}\cos(t)$

   (c) $h(t) = t^2 - 3t - 2e^{-t}\sin(3t)$

   (d) $k(t) = te^{2t}\cos(5t)$

   (e) $s(t) = e^{-t}t\sin(2t) + e^{6t} - 1$

   (f) $r(t) = t^2\cos(bt)$