MATH-266
Homework #17 (Section 8.4)
Due 07/25/14 **Name:** _____

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. Find the Laplace transform of the given functions.

   (a) $-20\,\mathcal{U}(t-4)$

   (b) $3\,\mathcal{U}(t-5)+6\,\mathcal{U}(t-8)$

   (c) $-12(t+2)^3\,\mathcal{U}(t-3)$

   (d) $-2\cos(t-\frac{\pi}{4})\,\mathcal{U}(t-\frac{\pi}{4})$

   (e) $f(t)=\begin{cases} 1, & 0\le t<2 \\ 3-t, & 2\le t<3 \end{cases}$.
   and $f(t)=f(t-3)$ if $t\ge 3$.

2. Find the inverse Laplace transform of the given functions.

   (a) $\dfrac{2e^{2s}-5}{se^{5s}}$

   (b) $\dfrac{se^{-3s}}{s^2+9}$

   (c) $\dfrac{se^{-3s}}{s^2+4s+5}$

   (d) $\dfrac{e^{-3s}(s-5)}{(s+1)(s+2)}$

3. Solve the given initial value problems using the method of Laplace transforms.

   (a) $\begin{cases} y''+4y=g(t) \\ y(0)=1 \\ y'(0)=3 \end{cases}$.
   where $g(t)=\begin{cases} \sin(t), & 0\le t\le 2\pi \\ 0, & 2\pi<t \end{cases}$.

   (b) $\begin{cases} y''+4y'+4y=\mathcal{U}(t-\pi)-\mathcal{U}(t-2\pi) \\ y(0)=0 \\ y'(0)=0 \end{cases}$.