Math 266 Summer 2016 Quiz 8

	$f(t) = \mathcal{L}^{-1}\{F(s)\}$	$F(s) = \mathcal{L}\{f(t)\}$
1.	e^{at}	$\frac{1}{s-a}$
2.	$\sin at$	$\frac{a}{s^2+a^2}$
3.	$\sinh at$	$\frac{a}{s^2-a^2}$
4.	$\cosh at$	$\frac{s}{s^2-a^2}$

High: 20
Low: 13
Average: 17

1) Find the inverse Laplace transform of $F(s) = \frac{5}{2s^2-2}$.

$f(t) = \mathcal{L}^{-1}\{F(s)\} = \frac{5}{2}\mathcal{L}^{-1}\left\{\frac{1}{s^2-1}\right\} = \frac{5}{2}\sinh(t)$

$= \frac{5}{4}(e^t - e^{-t})$

2) Solve the initial value problem using the Laplace transform.

$$y'' - y' - 2y = 0; \quad y(0) = 0, \quad y'(0) = 3$$

$\mathcal{L}\{y''\} - \mathcal{L}\{y'\} - 2\mathcal{L}\{y\} = \mathcal{L}\{0\}$

$s^2Y(s) - sy(0) - y'(0) - [sY(s) - y(0)] - 2Y(s) = 0$

$s^2Y(s) - 0 - 3 - sY(s) + 0 - 2Y(s) = 0$

$(s^2 - s - 2)Y(s) = 3$

$Y(s) = \frac{3}{s^2-s-2} = \frac{3}{(s-2)(s+1)}$

$3 = A(s+1) + B(s-2)$

$\Rightarrow \begin{cases} A+B=0 \\ A-2B=3 \end{cases}$

$\Rightarrow A = 1, B = -1$

$Y(s) = \frac{1}{s-2} - \frac{1}{s+1}$

$y(t) = \mathcal{L}^{-1}\left\{\frac{1}{s-2}\right\} - \mathcal{L}^{-1}\left\{\frac{1}{s+1}\right\}$

$= e^{2t} - e^{-t}$