## QUIZ 10 - MATH 310 YOUR NAME:

Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Use Laplace transforms to solve the initial value problem

$$y'' + 5y = \delta(t - 1) + u_5(t), \quad y(0) = 0, \ y'(0) = 1.$$

$f(t) = \mathcal{L}^{-1}\{F(s)\}$	$F(s) = \mathcal{L}{f(t)}$
1. 1	$\frac{1}{s}$ , $s > 0$
2. $e^{at}$	$\frac{1}{s-a}, \qquad s > a$
3. $t^n$ , $n = \text{positive integer}$	$\frac{n!}{s^{n+1}}, \qquad s > 0$
4. $t^p$ , $p > -1$	$\frac{\Gamma(p+1)}{s^{p+1}}, \qquad s > 0$
5. sin <i>at</i>	$\frac{a}{s^2 + a^2}, \qquad s > 0$
6. cos <i>at</i>	$\frac{s}{s^2+a^2}, \qquad s>0$
7. sinh at	$\frac{a}{s^2 - a^2}, \qquad s >  a $
8. cosh at	$\frac{s}{s^2 - a^2}, \qquad s >  a $
9. $e^{at} \sin bt$	$\frac{b}{(s-a)^2+b^2}, \qquad s > a$
10. $e^{at} \cos bt$	$\frac{s-a}{(s-a)^2+b^2}, \qquad s>a$
11. $t^n e^{at}$ , $n = \text{positive integer}$	$\frac{n!}{(s-a)^{n+1}}, \qquad s > a$
12. $u_c(t)$	$\frac{e^{-cs}}{s}, \qquad s > 0$
13. $u_c(t)f(t-c)$	$e^{-cs}F(s)$
14. $e^{ct}f(t)$	F(s-c)
15. $f(ct)$	$\frac{1}{c}F\left(\frac{s}{c}\right), \qquad c > 0$
$16.  \int_0^t f(t-\tau)g(\tau)d\tau$	F(s)G(s)
17. $\delta(t-c)$	$e^{-cs}$
18. $(-t)^n f(t)$	$F^{(n)}(s)$