

**MA 26600 ORDINARY DIFFERENTIAL EQUATIONS
FINAL EXAM (SUMMER 2012)
AUGUST 2, 2012**

NAME _____ PURDUE ID NO. _____

Circle the name of your INSTRUCTOR.

Shuhao Cao
Sec. 0003
8:40 am - 9:40 am

Alan Legg
Sec. 0001
9:50 am - 10:50 am

Richard Eden
Sec. 0002
11:00 am - 12:00 pm

INSTRUCTIONS

1. There are 17 problems and a total of 13 pages (after this cover page).
2. The last page has a table of Laplace transforms. You may detach this page from the exam for easy reference.
3. This exam has two parts.
 - (a) Problems 1 to 10 are multiple choice questions, each worth 8 points. Total: 80 points. You will be graded for your answer, not your solution. Write the letter of your answer in the box provided.
 - (b) Problems 11 to 17 require written detailed solutions. Total: 120 points. Put your answer in the provided box. Partial credit (subject to your instructor's judgment) will be given for sufficient progress leading to the correct answer.
4. If you need more space for your work, use the back of a page.
5. Read the problems carefully. The exam is self-explanatory.
6. No calculators are allowed.
7. **DON'T TURN THE PAGE YET UNTIL TOLD TO DO SO.**

Good luck!

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