REVIEW FOR EXAM ONE, MTH 205, SPRING 008
THIS IS NOT THE TEST BUT TO TEST A TEST!!

AYMAN BADAWI

QUESTION 1. (1) *Find* $\ell\{5^{2x+8}\}$

(2) *Find* $\ell\{xe^{2x}sin(3x) + 3^{-x}cos(4x)\}$

(3) *Find* $\ell\{\int_0^t r^2 e^{8r-2t}\ dr\}$

(4) *Find* $\ell\{U(x-\pi/2)e^{x+\pi}sin(x)\}$

(5) *Find* $\ell^{-1}\{\frac{se^{-6s}}{s^2+9}\}$

(6) *Find* $\ell^{-1}\{\frac{3s}{(s+3)^2+16}\}$

(7) *Find* $\ell^{-1}\{\frac{2}{s^2+6s+13}\}$
(8) *Use CONVOLUTION to find* $\ell^{-1}\{\frac{6}{s(s^2+9)}\}$

(9) *Show that f(x)*[h(x) + k(x)] = f(x)*h(x) + f(x)*k(x).*

(10) *Use convolution to find* $\ell^{-1}\{\frac{4}{(s-5)^2}\}$

(11) *Use convolution to find* $\ell^{-1}\{\frac{1}{s^2+8s+12}\}$

(12) *Find* $\ell^{-1}\{\frac{1}{(3s+7)^2}\}$

(13) *Find* $\ell^{-1}\{\frac{3s}{(5-2s)^3}\}$

(14) *Find* $\ell^{-1}\{\frac{7s}{(s^2+4)2}\}$

(15) *USE CONVOLUTION and the formula* $cos(A)Cos(B) = [Cos(A+B) + COS(A-B)]/2$ *to find* $\ell^{-1}\{\frac{1}{(s^2+9)^2}\}$.

QUESTION 2. *Find the largest interval so that* $\frac{x-9}{x^2-16}y^{(2)} + \sqrt{12-x}y' + xy = 10, y'(5) = 7, y(5) = -6$ *has a unique solution.*

QUESTION 3. *1)Use Laplace to solve* $y^{(2)} + 2y' + y = e^x,\ y'(0) = y(0) = 0$

2) Solve the above D.E using a different method.

QUESTION 4. *1. Use LAPLACE to find the general solution to* $y^{(2)} - 3y' + 2y = e^{-6x}$

2. Solve the above D.E. using a different method.

QUESTION 5. *1. Use Laplace to solve* $y^{(2)} + 16y = 2sin4x, y'(0) = -0.5, y(0) - 0$ *[Use the fact* $\ell^{-1}\{\frac{2b^3}{(s^2+b^2)^2}\} = sinbx - bxcosbx$*]*

2. Use a different method to solve the above D.E.

QUESTION 6. *1. Use laplace to find the general solution to* $y^{(4)} + 6y^{(3)} = 6 + 12e^x$.

2) Use a different method to solve the ABOVE D.E.

QUESTION 7. *Given* $y^{(2)} + 6y' + 8y = xe^{-4x}$. *Describe the particular solution to the D.E, but do not find it.*

QUESTION 8. *Find the general solution to* $y^{(3)} + 6y' - 7y = 3 + x + x^2$, *given* $y = e^x$ *is a solution to the associated homogeneous D.E.*

QUESTION 9. *Solve for* $f(x)$ *if* $f(x) = 3x^2 - e^-x - \in_0^x f(y)e^{x-y}\, dy$

QUESTION 10. *Use LAPLACE to solve* $2y^{(2)} + 6y' - 8y = 24e^{-x}, y(0) = -1, y'(1) = 0$,

QUESTION 11. *Discuss the solution to (1) and (2).....Does that make you SHAKING!!!! Is there a contradiction to one of our THEOREM? What went WRONG!!!*

1) $y^{(2)} + y = 0, y(0) = 0, y'(\pi/2) = 0$

2) $y^{(2)} + y = 0, y(0) = 0, y'(\pi/2) = 1$.

QUESTION 12. *Use Laplace to solve:*

Solve for $x(t)$ *and* $y(t)$ *if* $y^{(2)} + x + y = 0$ *and* $x' + y' = 0$ *and* $y(0) = y'(0) = x(0) = 0$.

FOR APPLICATIONS ON SPRING SEE CLASS NOTES + QUESTIONS 21, 23, 25, and 36 in the TEXT BOOK.

Department of Mathematics & Statistics, American University Of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates

E-mail address: abadawi@aus.edu, www.ayman-badawi.com