QUIZ 6

Math 3321

Name: **March 4, 2008**

Question 1. *(2pts) Multiple choice*
The Laplace transform $F(s)$ of

$$f(x) = 2 - 5x + 3x^2 e^{2x}$$

is

1. $F(s) = 2 - \frac{5}{s} + \frac{3}{s^2}$
2. $F(s) = 2 - \frac{5}{s} + \frac{6}{(s-2)^3}$
3. $F(s) = \frac{2}{s} - \frac{5}{s^2} + \frac{6}{s^3}$
4. $F(s) = \frac{2}{s} - \frac{5}{s^2} + \frac{3}{(s-2)^3}$
5. $F(s) = \frac{2}{s} - \frac{5}{s^2} + \frac{6}{(s-2)^3}$
6. *None of the above.*

Question 2. *(3pts)*

$$y'' + 5y' + 6y = 2e^{2x}\cos x - 3xe^{3x} + 5e^{-2x}$$

Give a suitable form of the particular solution $z(x)$ for the above non-homogeneous equation:

$r^2 + 5r + 6 = 0$

$(r+3)(r+2) = 0$ $\quad \{e^{-3x}, e^{-2x}\}$

Form of z:

$z = e^{2x}(A\cos x + B\sin x) + (Cx + D)e^{3x} + Exe^{-2x}$

Question 3. *(5pts) Find the Laplace transform $Y(s) = \mathcal{L}[y]$ of the solution y to the following initial-value problem:*

$$y'' - 2y' - 15y = 3 + 4e^{-3x}$$
$$y(0) = 1$$
$$y'(0) = -3$$

$$s^2 Y - sy(0) - y'(0) - 2(sY - y(0)) - 15Y = \frac{3}{s} + \frac{4}{s+3}$$

$$(s^2 - 2s - 15)Y - s + 3 + 2 = \frac{3}{s} + \frac{4}{s+3}$$

$$(s^2 - 2s - 15)Y = \frac{3}{s} + \frac{4}{s+3} + s - 5$$

Laplace transform of y:

$$\mathcal{L}[y] = Y = \frac{3}{s(s^2-2s-15)} + \frac{4}{(s+3)(s^2-2s-15)} + \frac{s-5}{s^2-2s-15}$$