**I. Given $(D-a)(D-b)y=0$, where $D=\dfrac{dy}{dx}$, then**

**Page 410:** If $a \neq b$, then $y = c_1 e^{ax} + c_2 e^{bx}$ Has unknown constants $c_1$, $c_2$.

**Page 410:** If $a = b$, then $y = (Ax + B)e^{ax}$ Has unknown constants $A$, $B$.

**Page 411:** If $a = \alpha + i\beta$, and $b = \alpha - i\beta$, then

$$y = e^{\alpha x}\left(Ae^{i\beta x} + Be^{-i\beta x}\right)$$ Has unknown constants $A$, $B$.

OR

$$y = e^{\alpha x}\left(c_1 \sin(\beta x) + c_2 \cos(\beta x)\right)$$ Has unknown constants $c_1$, $c_2$.

OR

$$y = Ce^{\alpha x}\sin(\beta x + \gamma)$$ Has unknown constants $C$, $\gamma$.

**II. Given $(D-a)(D-b)y=f(x)$, where $D=\dfrac{dy}{dx}$, then**

**First solve the equation above in part I. Then, to that solution, add a particular solution $y_p$ of the following form:**

**No Page:** If $f(x) = k$, then $y_p = C$. Plug $y_p$ into original equation to find $C$.

**Page 420:** If $f(x) = ke^{cx}$, then compare the given values for $a$, $b$, and $c$:

If all three $(a, b, c)$ are unequal: $y_p = Ce^{cx}$
If $(a \neq b)$, but $c = (a \text{ or } b)$: $y_p = Cxe^{cx}$
If $(a = b = c)$,: $y_p = Cx^2e^{cx}$

**Page 421 (sort of) :** If $f(x) = k\sin(wx)$ or $f(x) = k\cos(wx)$ , then:

$y_p = K_1\sin(wx) + K_2\cos(wx)$ Plug $y_p$ into original equation to find $K_1$, $K_2$.