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# Project Report for ECE 351

## *PreLab 06 - Partial Fraction Expansion*

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Skyler Corrigan

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ECE351 Code Repository:

*[https : //github.com/ElfinPeach/ECE351\\_code.git](https://github.com/ElfinPeach/ECE351_code.git)*

ECE351 Report Repository:

*[https : //github.com/ElfinPeach/ECE351\\_report.git](https://github.com/ElfinPeach/ECE351_report.git)*

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## 1 Part 1

The transfer function is as follows:

$$H(s) = \frac{Y(s)}{X(s)} = \frac{s^2+6s+12}{s^2+10s+24}$$

## 2 Part 2

$Y(s)$  when  $x(t) = u(t)$  ( $x(s) = \frac{1}{s}$ ) is as follows:

$$Y(s) = \frac{s^2+6s+12}{s(s^2+10s+24)}$$
$$Y(s) = \frac{1}{s+6} - \frac{1}{2(s+4)} + \frac{1}{2s}$$

Converting to  $y(t)$ :

$$y(t) = e^{-6t} - \frac{e^{-4t}}{2} + \frac{1}{2}$$

Part 7.)

$$y''(t) + 10y'(t) + 24y(t) = x''(t) + 6x'(t) + 12x(t)$$

$$Y(s)(s^2 + 10s + 24) = X(s)(s^2 + 6s + 12)$$

$$H(s) = \frac{Y(s)}{X(s)} = \frac{s^2 + 6s + 12}{s^2 + 10s + 24}$$

Part 2.)

$$\text{Let } x(t) = u(t)$$

calculator says!

$$Y(s) = \frac{s^2 + 6s + 12}{s(s^2 + 10s + 24)} = \frac{1}{s+6} - \frac{1}{2(s+4)} + \frac{1}{2s}$$

$$y(t) = e^{-6t} - \frac{e^{-4t}}{2} + \frac{1}{2}$$