Unit 3 Lesson 8

- We can use ~~a~~ table of known/computed general Laplace tran-sforms to compute inverses of these transforms, but we still need a way to break what we are acting on down.
- Recall the existence of partial fractions:
  - Split the considered function's denominator and set the numerator into A, B, C, etc.
- The Heaviside coverup allows us to quickly compute A, B, etc:
  - Cover a factor in the denominator and set the variable of the top and bottom to that factor; for example,

$$\frac{s-7}{(s-1)(s+2)} = \frac{(-9/-3)}{s+2} + \frac{(-6/3)}{s-1} = \frac{3}{s+2} + \frac{-2}{s-1}$$

Example Problems

1: $\dfrac{2s+1}{s^2+9} = 2\dfrac{s}{s^2+9} + \dfrac{1}{3}\dfrac{3}{s^2+9}$

has very quick inverse

$2\cos(3t) + \frac{1}{3}\sin(3t)$

2: $\dfrac{s^2+2}{s^3-s} = \dfrac{s^2+2}{s(s^2-1)} = \dfrac{s^2+2}{s(s-1)(s+1)} = \dfrac{A}{s} + \dfrac{B}{s-1} + \dfrac{C}{s+1}$

$= \dfrac{-2}{s} + \dfrac{3}{2(s-1)} + \dfrac{3}{2(s+1)}$

which has inverse

$-2 + \frac{3}{2}e^{t} + \frac{3}{2}e^{-t}$