

## Extra Algebra Practice

1. Complete the square. That is, express the given quadratic in the form  $a(s - b)^2 + c$ .

(a)  $s^2 - 3s$

(b)  $s^2 + 2s + 5$

(c)  $3s^2 + 6s + 15$

(d)  $2s^2 + 3s + 1$  (Yes, some fractions are involved)

2. Invert  $F(s)$  using the table for Laplace transforms:

(a)  $\frac{3s + 5}{s^2 + 7}$

(b)  $\frac{3s + 5}{(s - 2)^2 + 7}$

(c)  $\frac{3s - 5}{2s^2 + 3s + 1}$

3. Use partial fraction decomposition to write the given expression as an appropriate sum:

(a)  $\frac{s - 9}{s^2 - 3s + 10}$

(b)  $\frac{10}{(s - 1)(s^2 + 9)}$

(c)  $\frac{s^3 + s^2 + 2s + 1}{(s^2 + 1)(s^2 + 4)}$  (It's not as bad as it looks)

4. Use Table Entry 13 to invert the transform (careful of the notation!)

(a)  $u_3(t)e^{2t}$

(b)  $u_2(t)t^2$

(c) Challenge problem:  $u_2(t) \cos(3t)$

## Maple Commands and Chapter 6

In this note, we discuss using the following commands. Before using the first two commands, we must type the first line below (`inttrans` is short for *integral transforms*)

```
with(inttrans):  
laplace(f(t),t,s)  
invlaplace(F(s),s,t)  
convert(g(s),parfrac,s)  
Heaviside(t-c)
```