Chapter 1

edexcel :"\#:
Algebraic Methods
1.3 Partial Fractions 3

Edexcel A level Mathematics
Pure Mathematics
Year 2

Repeated Linear Factors
(E) $2 \mathrm{~g}(x)=\frac{-x^{2}-10 x-5}{(x+1)^{2}(x-1)}, x \neq-1, x \neq 1$

Find the values of the constants $D, E$ and $F$ such that $\mathrm{g}(x)=\frac{D}{x+1}+\frac{E}{(x+1)^{2}}+\frac{F}{x-1} \quad$ (4 marks)

$$
\begin{array}{rlrl}
-x^{2}-10 x-5 & =D(x+1)(x-1)+E(x-1)+F(x+1)^{2} \\
x=1 & & =F(1+1)^{2} \\
-1^{2}-10(1)-5 & =4 F \\
-16 & =F & F=-4
\end{array}
$$

$$
\begin{array}{rlr}
x=-1-(-1)^{2}-10(-1)-5 & =E(-1-1) & \\
-1+10-5 & =-2 E \\
4 & =-2 E \\
\frac{4}{-2} & =E \quad E=-2
\end{array}
$$

coeft of $x^{2}$

$$
\begin{aligned}
-1 & =D+F \\
-1 & =D-4 \\
-1+4 & =D
\end{aligned}
$$

$$
D=3
$$

(E) 4 Show that $\frac{5 x^{2}-2 x-1}{x^{3}-x^{2}}$ can be written in the form $\frac{C}{x}+\frac{D}{x^{2}}+\frac{E}{x-1}$ where $C, D$ and $E$ are constants to be found.
(4 marks)

$$
\frac{5 x^{2}-2 x-1}{x^{2}(x-1)} \equiv \frac{C}{x}+\frac{D}{x^{2}}+\frac{E}{x-1}
$$

$$
\begin{array}{rlrl}
5 x^{2}-2 x-1 & \equiv C x(x-1)+D(x-1)+E x^{2} \\
x=0 & & \equiv D(0-1) & \\
& & \\
x=1 & 5(1)^{2}-2(1)-1 & =E(1)^{2} & \\
2 & =E & E=1
\end{array}
$$

coeff of $x^{2}$

$$
\begin{aligned}
5 & =C+E \\
5 & =C+2 \\
5-2 & =C
\end{aligned}
$$

$$
c=3
$$

