

## FP2 Algebra

### 1. [Jan 2010 qu. 6](#)

(i) Express  $\frac{4}{(1-x)(1+x)(1+x^2)}$  in partial fractions. [5]

(ii) Show that  $\int_0^{\frac{1}{\sqrt{3}}} \frac{4}{1-x^4} dx = \ln\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right) + \frac{1}{3}\pi$ . [4]

### 2. [June 2009 qu. 2](#)

Given that  $y = \frac{x^2 + x + 1}{(x-1)^2}$ , prove that  $y \geq \frac{1}{4}$  for all  $x \neq 1$ . [4]

### 3. [June 2009 qu. 4](#)

Express  $\frac{x^3}{(x-2)(x^2+4)}$  in partial fractions. [6]

### 4. [June 2008 qu. 1](#)

It is given that  $f(x) = \frac{2ax}{(x-2a)(x^2+a^2)}$  where  $a$  is a non-zero constant.

Express  $f(x)$  in partial fractions.

### 5. [June 2007 qu. 3](#)

It is given that  $f(x) = \frac{x^2 + 9x}{(x-1)(x^2+9)}$ .

(i) Express  $f(x)$  in partial fractions. [4]

(ii) Hence find  $\int f(x) dx$ . [2]

### 6. [Jan 2006 qu.3](#)

Express  $\frac{x+6}{x(x^2+2)}$  in partial fractions. [5]

### 7. [June 2010 qu. 2](#)

Given that the first three terms of the Maclaurin series for  $(1 + \sin x)e^{2x}$  are identical to the first three terms of the binomial series for  $(1 + ax)^n$ , find the values of the constants  $a$  and  $n$ . (You may use appropriate results given in the List of Formulae (MF1).) [6]