

## C4 Partial Fractions Questions

### Specimen

4. (a) Express  $\frac{3x^2 + 2x + 1}{x^2(x-1)}$  in terms of partial fractions. [4]

(b) Find  $\int \frac{3x^2 + 2x + 1}{x^2(x-1)} dx$ . [3]

### 2005 Summer

1. (a) Express  $\frac{8x^2 + x - 5}{(2x-1)^2(x+2)}$  in partial fractions. [4]

(b) Find  $\int \frac{8x^2 + x - 5}{(2x-1)^2(x+2)} dx$ . [3]

### 2006 Summer

1. Given that

$$f(x) = \frac{2x^2 + 4}{(x-2)^2(x+4)},$$

(a) express  $f(x)$  in partial fractions. [4]

(b) hence find the value of  $f'(0)$ . [3]

### 2007 Summer

1. (a) Express  $\frac{x+3}{x^2(x-1)}$  in terms of partial fractions. [4]

(b) Find  $\int \frac{x+3}{x^2(x-1)} dx$ . [2]

### 2008 Summer

1. Given that

$$f(x) = \frac{1}{x^2(2x-1)},$$

(a) express  $f(x)$  in partial fractions, [4]

(b) find  $\int f(x)dx$ . [3]

### 2009 Summer

1. Given that

$$f(x) = \frac{3x}{(1+x)^2(2+x)},$$

(a) express  $f(x)$  in terms of partial fractions, [4]

(b) evaluate

$$\int_0^1 f(x)dx,$$

giving your answer correct to three decimal places. [4]

### 2010 Summer

1. The function  $f$  is defined by

$$f(x) = \frac{8-x-x^2}{x(x-2)^2}.$$

(a) Express  $f(x)$  in terms of partial fractions. [4]

(b) Use your result to part (a) to find the value of  $f'(1)$ . [3]

### 2011 Summer

1. Given that  $f(x) = \frac{x^2+x+13}{(x+2)^2(x-3)}$ ,

(a) express  $f(x)$  in terms of partial fractions, [4]

(b) evaluate

$$\int_6^7 f(x)dx,$$

giving your answer correct to three decimal places. [3]

### 2012 Summer

1. The function  $f$  is defined by

$$f(x) = \frac{11 + x - x^2}{(x+1)(x-2)^2}.$$

- (a) Express  $f(x)$  in terms of partial fractions. [4]  
(b) Use your result to part (a) to find the value of  $f'(0)$ . [3]

### 2013 Summer

1. The function  $f$  is defined by

$$f(x) = \frac{6 + x - 9x^2}{x^2(x+2)}$$

- (a) Express  $f(x)$  in terms of partial fractions. [4]  
(b) Using your result to part (a),  
(i) find an expression for  $f'(x)$ ,  
(ii) verify that  $f(x)$  has a stationary value when  $x = 2$ . [3]

### 2014 Summer

2. (a) Express  $\frac{5x^2 + 7x + 17}{(x+1)^2(x-4)}$  in terms of partial fractions. [4]  
(b) Use your answer to part (a) to express  $\frac{5x^2 + 9x + 9}{(x+1)^2(x-4)}$  in terms of partial fractions. [2]

### 2015

1. Given that  $f(x) = \frac{2x^2 + 5x + 25}{(x+3)^2(x-1)}$ ,  
(a) express  $f(x)$  in terms of partial fractions, [4]

- (b) evaluate

$$\int_3^{10} f(x) dx,$$

- giving your answer correct to two decimal places. [3]

2016

1. The function  $f$  is defined by

$$f(x) = \frac{17 + 4x - x^2}{(2x - 1)(x - 3)^2}.$$

- (a) Express  $f(x)$  in terms of partial fractions. [4]
- (b) Use your result to part (a) to find an expression for  $f'(x)$ . [2]

2017

1. (a) Express  $\frac{8x^2 + 7x - 25}{(x - 1)^2(x + 4)}$  in terms of partial fractions. [4]
- (b) Use your result to part (a) to express  $\frac{9x^2 + 5x - 24}{(x - 1)^2(x + 4)}$  in terms of partial fractions. [3]



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