Algebraic Division 2ii

A Level

Part A Quotient and Remainder

Find the quotient and the remainder when $3x^3 - 2x^2 + x + 7$ is divided by $x^2 - 2x + 5$.

Give the quotient.

The following symbols may be useful: x

Give the remainder.

The following symbols may be useful: x

Part B Value of a and b

Hence, or otherwise, determine the values of the constants a and b such that, when $3x^3 - 2x^2 + ax + b$ is divided by $x^2 - 2x + 5$, there is no remainder.

Give the value of a.

The following symbols may be useful: a

Give the value of b.

The following symbols may be useful: b

Functions: Graphs and Inverse Functions 3ii

A Level
C C C

The function $f(x)$ is defined by

$$f(x) = 1 + \sqrt{x} \text{ for } x \quad 0.$$

Part A Domain and Range

What is the domain of the inverse function $f^{-1}(x)$? Write your answer in the form of an inequality.

The following symbols may be useful: `<`, `<=`, `>`, `>=`, `f`, `x`, `y`

What is the range of the inverse function $f^{-1}(x)$? Write your answer in the form of an inequality.

The following symbols may be useful: `<`, `<=`, `>`, `>=`, `f`, `x`, `y`

Part B $f^{-1}(x)$

Find an expression for $f^{-1}(x)$.

The following symbols may be useful: `f`, `x`, `y`

Part C $f(x) = f^{-1}(x)$

Find the x-value that is the solution to the equation $f(x) = f^{-1}(x)$ to four significant figures.

Trigonometry: Double Angles 1ii

A Level

C C C

Part A The form $a\sin^2\theta + b\sin\theta + c = 0$

Express the equation $(\text{cosec}\,\theta)(3\cos 2\theta + 7) + 11 = 0$ in the form $a\sin^2\theta + b\sin\theta + c = 0$, where a, b, and c are constants.

Give the value of a.

The following symbols may be useful: a

Give the value of b.

The following symbols may be useful: b

Give the value of c.

The following symbols may be useful: c

Part B Solve

Hence solve, for $-180° < \theta < 180°$, the equation $(\text{cosec}\,\theta)(3\cos 2\theta + 7) + 11 = 0$. Give your answers in degrees, to three significant figures.

Give the highest (most positive) solution.

Give the lowest (most negative) solution.

Trigonometry: Combined Angles 4ii

A Level
C C C

Part A Combined Angles

Express in the form , where and .

Give the value of .

The following symbols may be useful: R

Give the value of to three significant figures.

Part B Solve

Hence solve, for , the equation , giving your answers in degrees to three significant figures.

Give the smallest solution.

Give the largest solution.

Part C Maximum Value

Hence find the greatest possible value of

as the angles and vary.