ATMAS Mathematics Specialist

Test 2 — Calculator Assumed

Name: ……………………………………………

Time Allowed : 25 minutes

Marks   /30

Materials allowed: Classpad, calculator.

Attempt all questions.
All necessary working and reasoning must be shown for full marks.
Where appropriate, answers should be given to <u>two</u> decimal places.
Marks may not be awarded for untidy or poorly arranged work.

1   The position vectors $\begin{pmatrix} 3 \\ 1 \\ -1 \end{pmatrix}$, $\begin{pmatrix} -5 \\ -2 \\ 2 \end{pmatrix}$ and $\begin{pmatrix} -14 \\ 9 \\ -2 \end{pmatrix}$ are all points on the plane P_1.

a)   Determine the vector equation of P_1.   (3)

b)   Determine the Cartesian equation of P_1.   (3)

2 Determine the shortest distance between the parallel planes $3x - 2y + 5z = 7$ and (6)
$3x - 2y + 5z = 15$, giving your answer as an exact value.

3 The equation $4x^2 + y^2 + 8x - 2y - 11 = 0$ describes an ellipse. Determine...
   a) The coordinates of the centre. (2)

   b) The length of the major axis. (1)
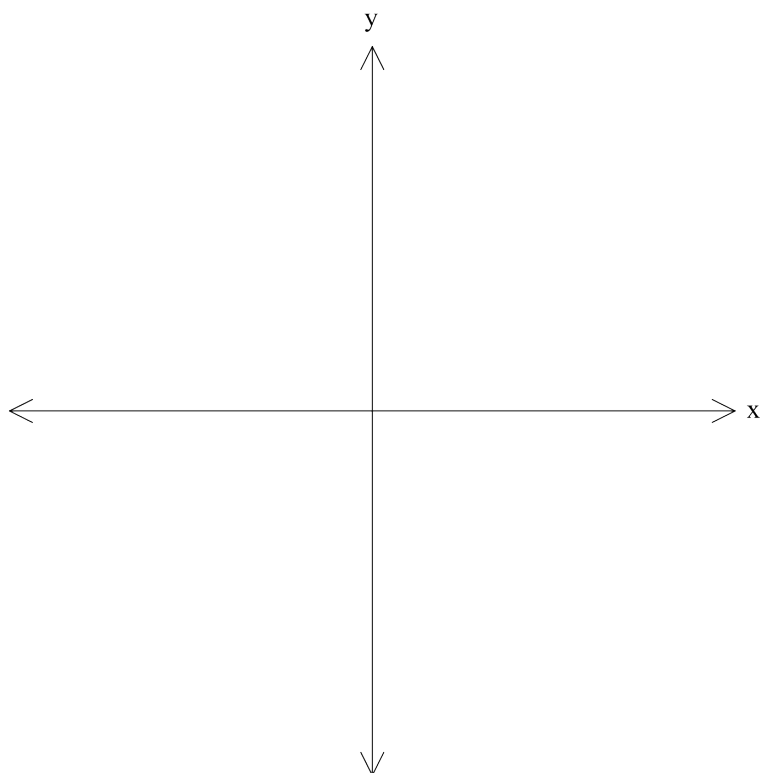
   c) The length of the minor axis. (1)

   d) The domain and range. (2)

4 Draw a sketch of each of the following rational functions, indicating on your sketch important features such as asymptotes, intercepts, and critical points.
- You may use your Classpad to find intercepts, these <u>do not</u> need to be shown algebraically.
- You may also use your Classpad to calculate any derivates required, however, you must then clearly show how you would <u>interpret the relevant calculus</u> to assist you with your sketch.

a) $y = \dfrac{3x^2}{x-1}$ (6)

y

x

b)
$$y = \frac{x^3 - 8}{(x - 1)(x + 1)}$$

(6)

y

x