**Self-assessment answers: 4 Algebraic structures**

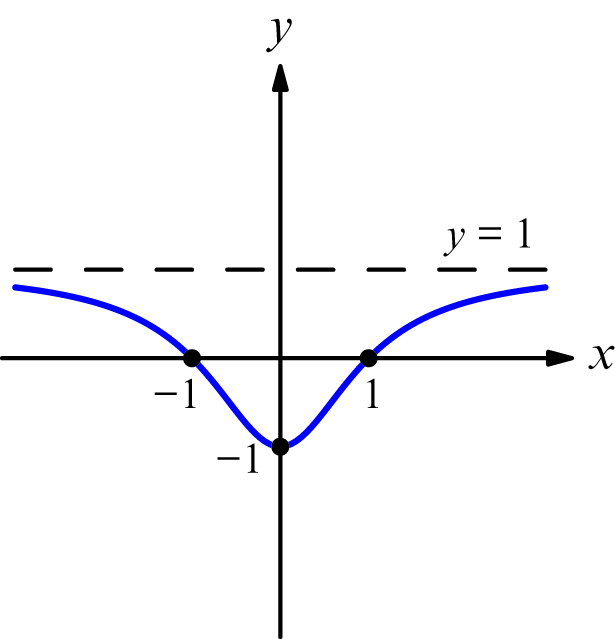
**1.** e2*x* **+** 2e*x* – 15 = 0

⇒ (e*x* + 5)(e*x* – 3) = 0

⇒ e*x* = −5 or 3. Reject the negative solution.

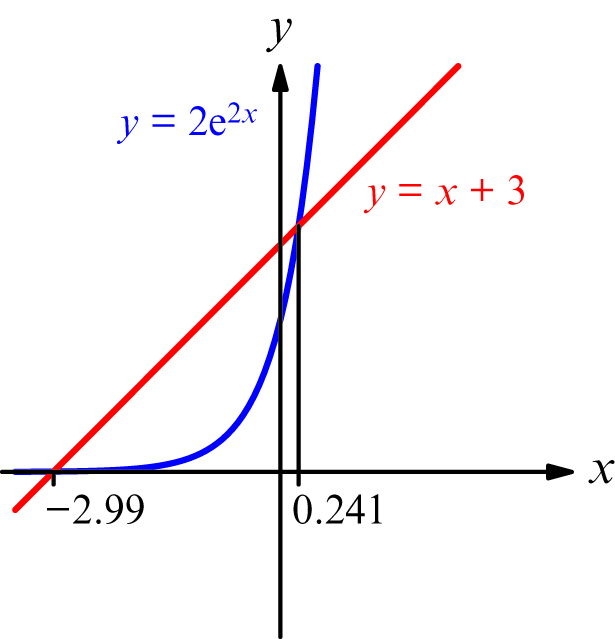
⇒ *x* = ln 3*[5 marks]*

**2.**



*[4 marks]*

**3.** Using a GDC:



So the interval for which 2e2*x* ≤ *x* + 3 is [−2.99, 0.241]*[4 marks]*

**4.** *x*2 + 1 = 5 − *x*

⇒ *x*2 + *x* – 4 = 0

⇒ 

⇒ are the points of intersection.*[6 marks]*

**5.** (a)  

(1) + (2) ⇒ 3*x* – *y* = 4 (4)

(3) + 5(1) ⇒ 6x – 2y = 25 + *k* (5)

(5) – 2(4) ⇒ 17 + *k* = 0

⇒ *k* = −17

(b) From the above, we see that (3) = 2(2) – 3(1); the three planes will have a linear intersection.

(4) gives that *y* = 3*x* − 4

Let *x* = *t*. Then *y* = 3*t* – 4.

(1) then gives *z* = 5 + 2*y* – *x* = 5*t* – 3

The general solution is:

****  *[11 marks]*