**Self-assessment answers: 4 The theory of functions**

**1.** (a) Domain ℝ; Range[−2, ∞[

(b) Domain *x* ∈ ℝ, *x* ≠ −3; Range *y* ∈ ℝ, *y* ≠ 1

(c) Domain *x* ∈ ℝ, *x* ≠ −2, 1; Range *y* ∈ ℝ, *y* ∉ ] −0.5, 3[ *[7 marks]*

**2.** *f* has domain  and range ℝ, so *f* −1 has domain ℝ and range ]2/3, ∞[

*f*(*x*) = ln(3*x* – 2), ⇒ e *f* (*x*) + 2 = 3x

⇒ *x* = 

⇒ *f* −1(*x*) = *[3 marks]*

**3.** *f g*(*x*) = *f* (*x* + 2) = 2(*x* + 2)2 − 11

2(*x* + 2)2 – 11 = 2*x* ⇒ 2*x*2 + 6*x* − 3 = 0

⇒ *x* = *[5 marks]*

**4.** (a) (i) 

(ii) *y* = 3, *x* = *b*

(iii) y ∈ ℝ, y ≠ 3

(b)  = 2 ⇒ 3*x* – *a* = 2*x* – 2*b*

⇒ *x* = *a* – 2*b*

(c)  ⇒ (*x* – *b*)*f* (*x*) = 3*x* − *a*

⇒ *x*(*f* (*x*) – 3) = *bf* (*x*) − *a*

⇒ 

⇒ . Domain of *f* −1 is range of *f* . *x* ∈ ℝ, x ≠ 3

(d) For *f*(*x*) to be the same as *f* −1(*x*), *b* = 3. *[15 marks]*