

# 2014 Specialist Mathematics Written examination 2 solutions

## SECTION 1

### Question 1

$$y = \pm \frac{2}{3}(x-3)$$

$$y = -\frac{2}{3}x + 2 \text{ and } y = \frac{2}{3}x - 2$$

y-intercepts are (0,2) and (0,-2); x-intercept is (3,0)

**B**

### Question 2

$$x^2 - 6x + 3^2 + 2(y^2 + 4y + 2^2) = -16 + 3^2 + 2 \times 2^2$$

$$\frac{(x-3)^2}{(1)^2} + \frac{(y+2)^2}{\left(\frac{1}{\sqrt{2}}\right)^2} = 1$$

centre (3,-2),  $a = 1$ ,  $b = \frac{1}{\sqrt{2}}$

**E**

### Question 3

$$f(x) = 1 + \frac{-3(x-3)}{(x-3)(x+2)} \text{ using long division}$$

$$f(x) = 1 - \frac{3}{x+2} \text{ providing } x \neq 3$$

Asymptotes are  $y = 1$  and  $x = -2$ . Point of discontinuity at  $x = 3$

**D**

### Question 4

$$2x - 1 \in [-1, 1]$$

$$2x \in [0, 2]$$

$$x \in [0, 1]$$

**C**

### Question 5

$$(2\sqrt{2})^2 \operatorname{cis}\left(2 \times \frac{3\pi}{4}\right) = 8 \operatorname{cis}\left(\frac{3\pi}{2}\right) = -8i$$

**A**

### Question 6

$$i^{2n+3} = i^3 i^{2n} = -i(i^n)^2 = -ip^2$$

**D**

### Question 7

$$(2 - \sqrt{3}i) + (2 + \sqrt{3}i) + 1 = 5$$

**E**