



### Algebra & Functions (Maths 201-016)

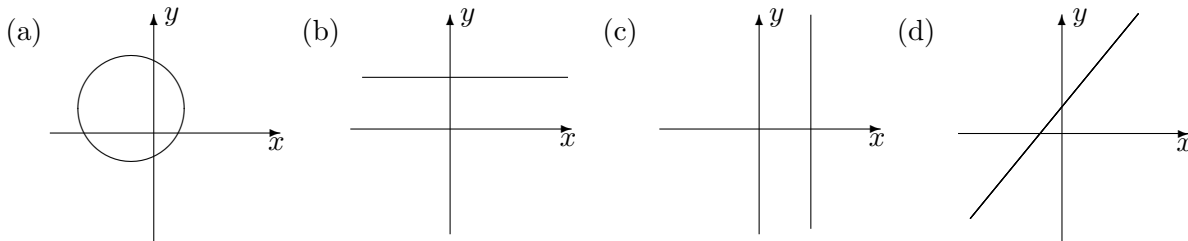
(Marks)

Show your work—**justify** all your answers. Just having the correct answer is not sufficient.

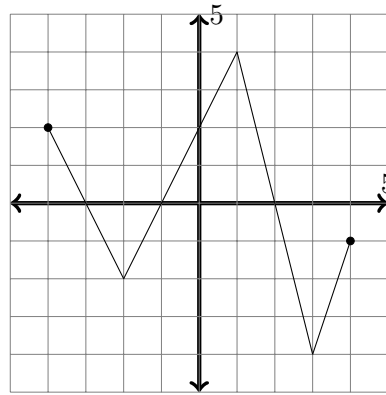
Pace yourself—a rough guide is to spend not more than 2m minutes on a question worth m marks.

- (4×2) 1. Given  $f(x) = \sqrt{x^2 + 16}$ ,  $g(x) = 2x + 1$ , calculate:  
(a)  $f(3) - g(3)$       (b)  $f(g(1))$       (c)  $g(x + 3)$       (d) all values  $x$  so that  $g(x) = 33$ .

- (3) 2. For the following graphs, say which ones are functions (and which are not).

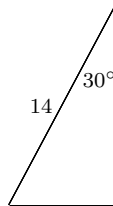


- (6) 3. For the function (whose graph is given), find (a) the domain, (b) the range, (c) the  $x$  and  $y$  intercepts, (d) the intervals where the function is positive, (e) the intervals where the function is negative, and (f) the local extrema.



- (5) 4. If  $\theta$  is an acute angle for which  $\cos \theta = \frac{5}{13}$ , find the values of the other five trigonometric functions. (Give exact values, simplified.)

- (4) 5. Given this right-angled triangle: find the two other side lengths. (Give exact values, simplified.)



- (3×2) 6. Evaluate the following logarithmic expressions. (Give your answers as exact simplified expressions.)

(a)  $\log_2\left(\frac{1}{32}\right)$       (b)  $\frac{\ln(e^6)}{\ln(e^{12})}$       (c)  $145 \log_{54}(5 - 4)$

- (6×3) 7. Solve the following equations:

(a)  $\sin(x) - \cos(x) = 0$       (b)  $5^{x+2} = 125^{(x^2)}$   
(c)  $\frac{1}{6} \log_5(x) = \frac{1}{2}$       (d)  $\log_2(x) + \log_2(x - 2) = 3$   
(e)  $5 = 4 + \frac{7^{2x+1}}{7^3}$       (f)  $4^{x+2} = \frac{1}{16}$