Instructor: Dr. R.A.G. Seely
(Dec 2019)

Test 4
(version A)

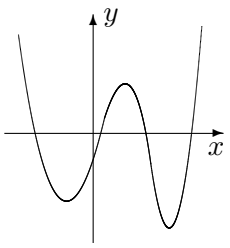
(Marks)

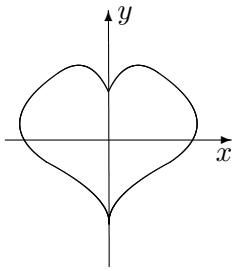
Algebra & Functions (Maths 201–016)

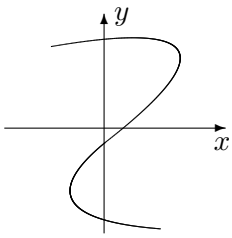
*Show your work—***justify** *all your answers. Just having the correct answer is not sufficient.*
Pace yourself—a rough guide is to spend not more than 2m minutes on a question worth m marks.

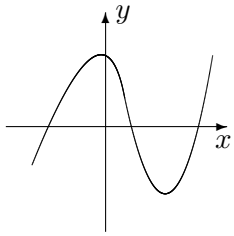
(4×2) 1. Given $f(x) = \sqrt{x^2+3}$, $g(x) = \sqrt{2-x}$, calculate (give your answers simplified!):
(a) $g(f(1))$ (b) $f(g(1))$ (c) $g(2-x)$ (d) all values x so that $f(x) = g(x)$.

(3) 2. Which of the following are graphs of relations for which y is a function of x (and which are not)?

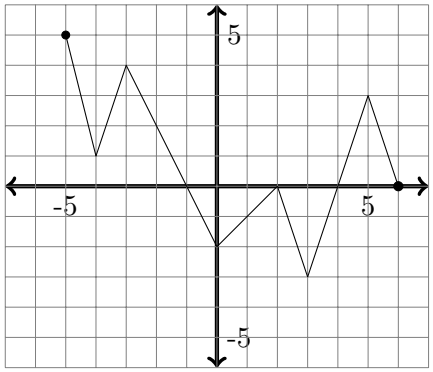
(a) 

(b) 

(c) 

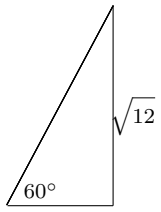
(d) 

(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 θ is an acute angle for which $\tan\theta = 0.8$ find the values of the other five trigonometric functions. (Give exact values, simplified.) (Hint: Write 0.8 as a simple fraction, 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) $\log_3(\frac{2}{54})$ (b) $21\log_7\left(\frac{1}{2}(11+3)\right)$ (c) $\dfrac{\ln(e^{48})}{\ln(e^{12})}$

(6×3) 7. Solve the following equations:
(a) $1 - 2\sin^2(x) = 0$ (b) $9^{3x-4} = (3^x)^x$
(c) $\log_4(x) + \log_4(x-6) = 2$ (d) $\frac{1}{9}\log_3(x) = -\frac{1}{3}$
(e) $5 = \dfrac{3^{6x+1}}{3^{x+6}} - 4$ (f) $5^{x-2} = \frac{1}{125}$

(Total: 50)