

Answer Key

MATH 110-001 QUIZ 1

September 22, 2017

Time: 15 minutes

9

Show all your work. No calculators, no books/notes are allowed.

Last name: _____ First name: _____

Student number: _____

1. (5 marks) Find the equation of the line passing through the y-intercept of the parabola $y = x^2 - 2x - 9$ and the x-intercept of the line $y = -7x - 13$. Leave your answer in $y = mx + b$ form.

5

y-intercept of the parabola: $x=0$

$$y = (0)^2 - 2(0) - 9 = -9$$

$\therefore (0, -9)$ ← 1 mark

x-intercept of the line: $y=0$

$$0 = -7x - 13$$

$$7x = -13$$

$$x = -\frac{13}{7}$$

$\therefore (-\frac{13}{7}, 0)$ ← 1 mark

Equation of line: $y = mx + b$ or $y - y_1 = m(x - x_1)$ 1 mark

$$m = \frac{-9 - 0}{0 - (-\frac{13}{7})} = \frac{-9}{13/7} = -\frac{63}{13}$$

$b = -9$ (y-intercept of parabola)

$$\therefore y = -\frac{63}{13}x - 9$$

\uparrow \uparrow
m b

- ① Correct form, m, b = 2 marks
- ② Incorrect form (not simplified) but correct m, b = 1 mark
- ③ Incorrect m or b = 1 mark
- ④ Incorrect m and b = 0 mark

2. (4 marks) We have the following functions:

$$f(x) = \frac{x}{x-3} \quad g(x) = \sqrt{1+x} \quad h(x) = \begin{cases} 2x & \text{if } x \leq 1 \\ 5-x & \text{if } x > 1 \end{cases}$$

a) Compute $f \circ h(1)$

b) Compute $h \circ f \circ g(15)$

Bonus (2 marks): Find the equation for $f \circ g(x)$ and its domain

a) $f \circ h(1) = f(h(1))$

$$h(1) = 2$$

$$f(2) = \frac{2}{-1} = \boxed{-2}$$

① Final answer correct = 2 marks

② Final answer incorrect, but right strategy (ex. $h(1) = 2$ is written) = 1 mark

③ No relevant work shown = 0 mark

b) $h \circ f \circ g(15) = h(f(g(15)))$

$$g(15) = \sqrt{16} = 4$$

$$f(4) = 4$$

$$h(4) = \boxed{1}$$

Bonus: $f \circ g(x) = \frac{\sqrt{1+x}}{\sqrt{1+x}-3}$

← 1 mark

Domain: $1+x \geq 0$
 $x \geq -1$

$$\sqrt{1+x}-3 \neq 0$$

$$\sqrt{1+x} \neq 3$$

$$1+x \neq 9$$

$$x \neq 8$$

$$\therefore x \in [-1, 8), (8, \infty)$$

or
 $-1 \leq x < 8, 8 < x < \infty$

← 1 mark