University of Nottingham
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Foundation Algebra for Physical Sciences and Engineering (CELEN036)

Answers to Homework 1

Topic 1: Composition of functions

1.

(i) $(f \circ g)(x) = \sqrt{3x-2}, x \geq \frac{2}{3} \quad (g \circ f)(x) = 3\sqrt{x-4}+2, x \geq 4$

(ii) $(f \circ g)(x) = \frac{6}{2-x}, x \neq 0 \text{ and } x \neq 2 \quad (g \circ f)(x) = \frac{2x-2}{3x}, x \neq 0 \text{ and } x \neq 1$

(iii) $(f \circ g)(x) = \sqrt{\frac{11x-7}{x-1}}, x \leq \frac{7}{11} \text{ or } x > 1 \quad (g \circ f)(x) = \frac{\sqrt{2x+7}+2x+7}{x+3}, x \geq -\frac{7}{2} \text{ and } x \neq -3$

(iv) $(f \circ g)(x) = x^2 + x - 2, x \in R \quad (g \circ f)(x) = x^2 - 3x + 2, x \in R$

2. $(f \circ g)(5) = 41$

3. $g(x) = 2x + 3$

4. $(f \circ g \circ h)(x) = 2x^2 + 16x + 29 \qquad (g \circ f \circ h)(x) = 4x^2 + 28x + 48$

5. $(f \circ g)(4) = 2 \qquad (g \circ f)(4) = 0.5$

Topic 2: Inverse functions

6.

(i) $f^{-1}(x) = x^3 - 5$

(ii) $f^{-1}(x) = \frac{x}{2-x}$

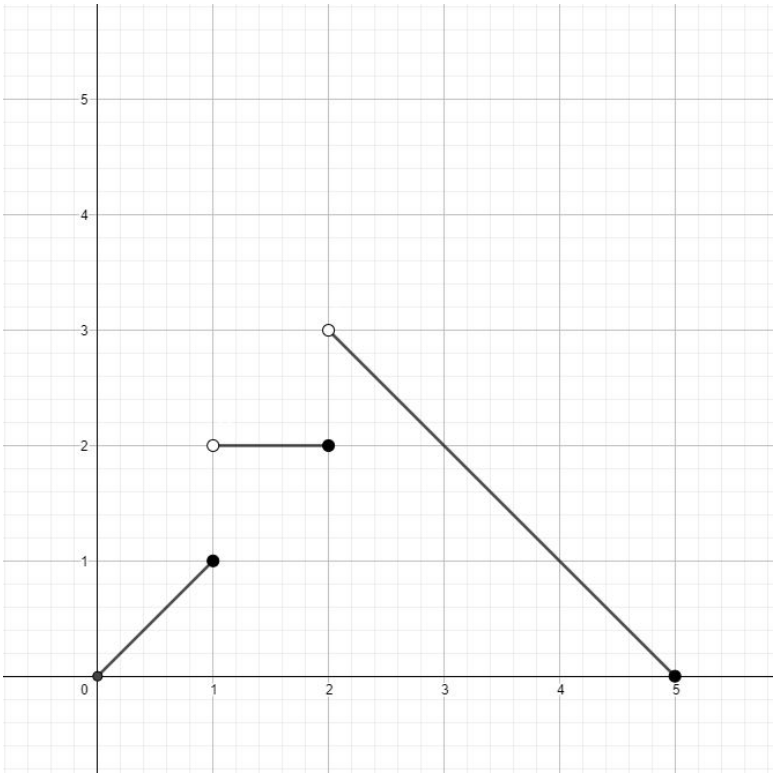
(iii) $f^{-1}(x) = 2\sqrt[3]{x} + 1$

(iv) $f^{-1}(x) = \sqrt{x-3}$

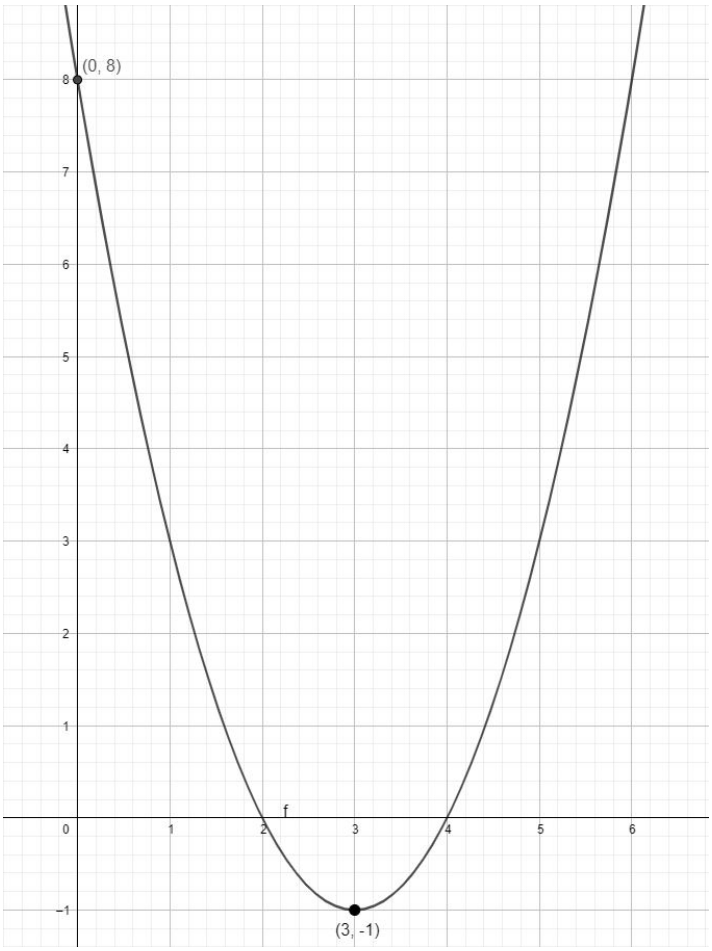
7. $g^{-1}(5) = 3 \qquad g(2) = 3 \qquad f^{-1}(2) = 5$

Topic 3: Sketching graphs of functions

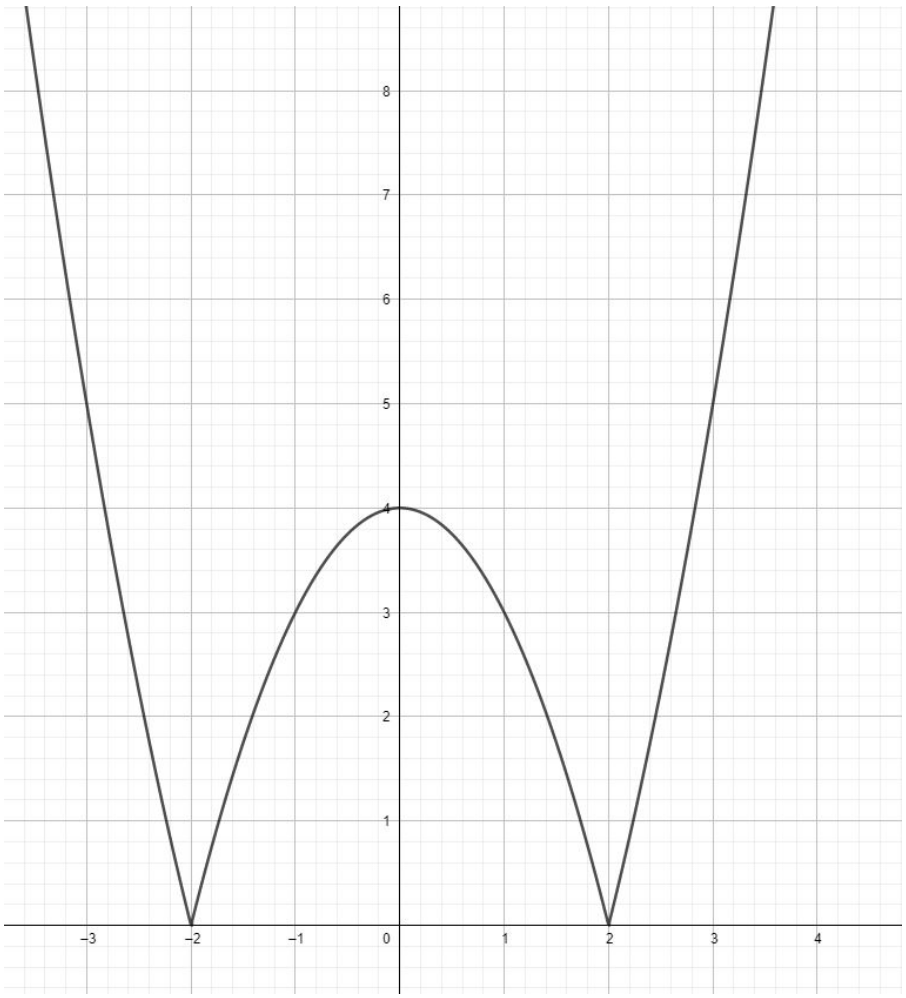
8. (i)



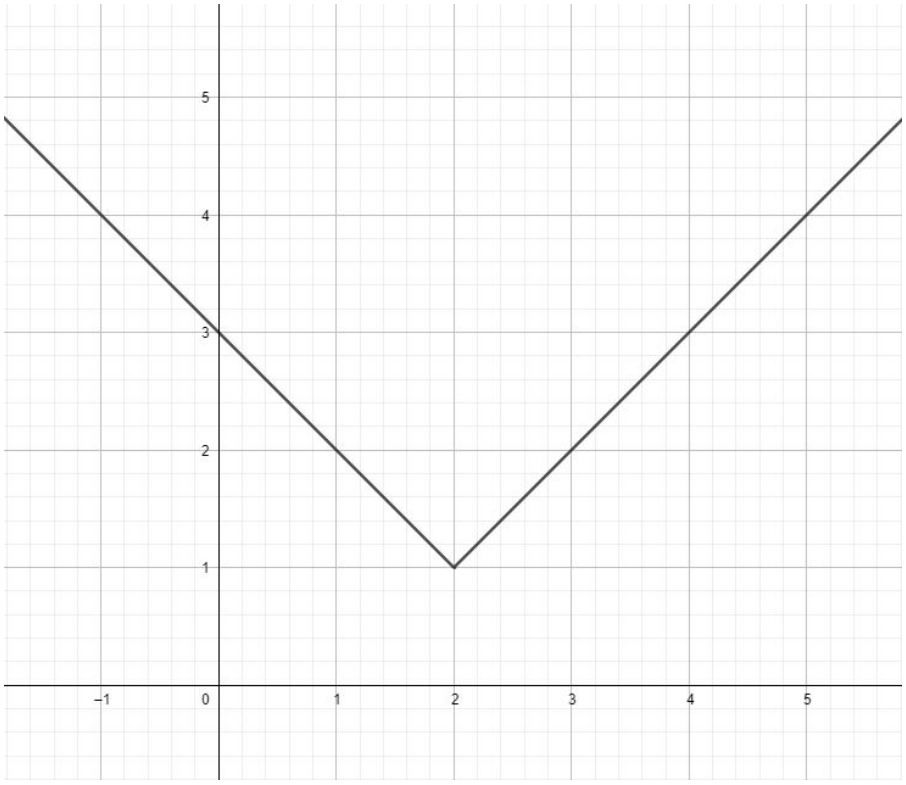
(ii)



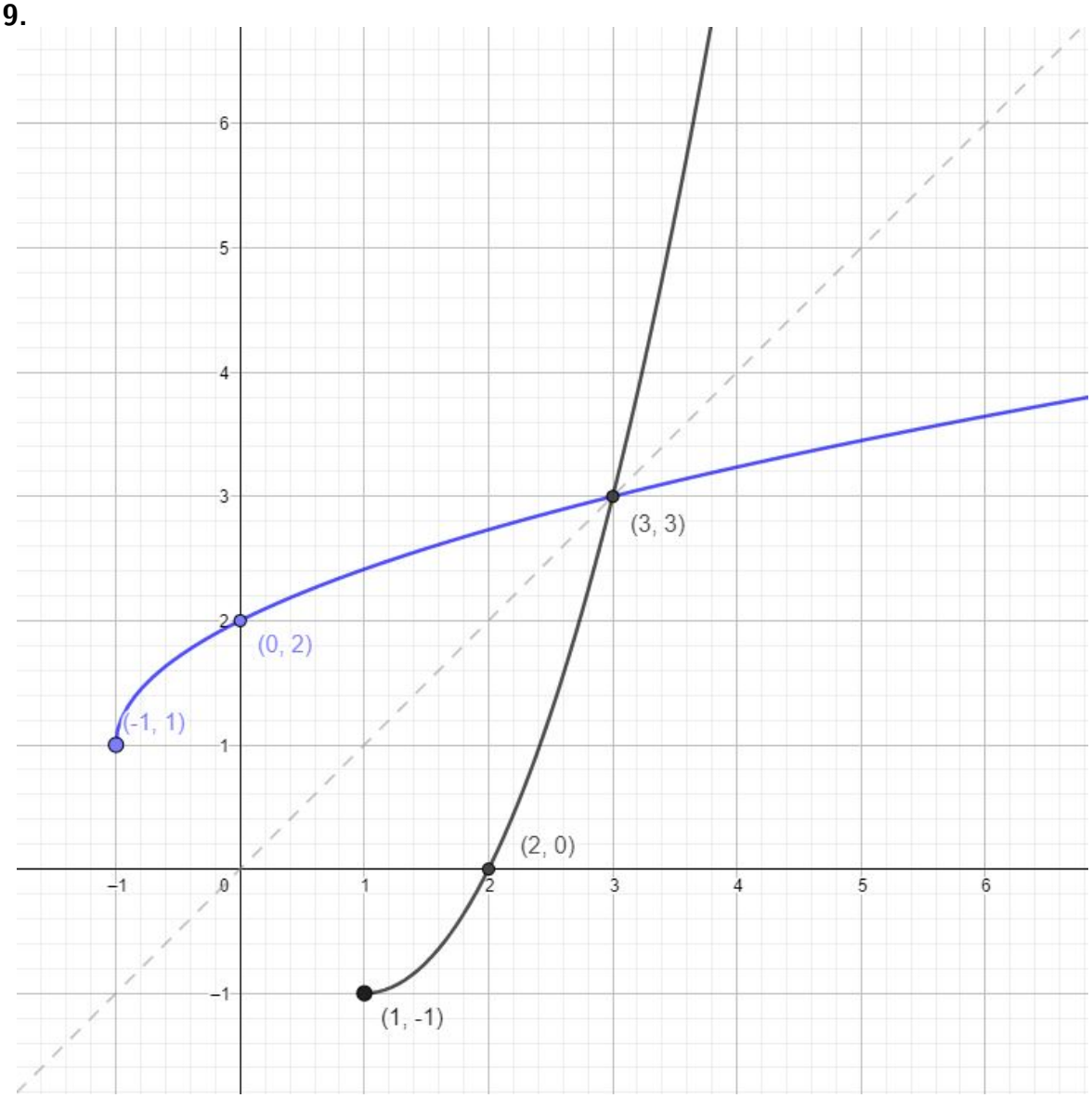
(iii)



(iv)



9.



Topic 4: Modulus inequalities

10.

(i) $-\frac{7}{4} \leq x \leq 0$

(ii) $x \geq \frac{7}{3},\ or\ x \leq -\frac{7}{3}$

(iii) $\frac{8}{3} \leq x \leq \frac{14}{3}$

(iv) $x \in R$

(v) $\frac{4}{3} \leq x \leq 4$

(vi) $x \leq \frac{3}{5}$

(vii) $x < -4,\ or\ x > 2$

(viii) $2 \leq x \leq 4$