2021 Year 12 ViSN Mathematics Specialist Unit 3

Test 2 – Functions

Section One – Calculator Free

Mr Daniel Comtesse

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Calculator Free:_____/32

Calculator Assumed:_____/11

Result: _____/43 _____%

Student Name: _____

School: _____

Time allowed: Section One - 35 minutes

Section Two – 15 minutes

Assessment Date: **22 March 2021**

Material required/recommended

To be provided by the supervisor

This Question/Answer Paper

SCSA Formula Sheet

To be provided by the candidate

Standard items: pens, pencils, pencil sharpener, eraser, correction fluid/tape, ruler, highlighters

Submission Details

Timed Assessments are to be returned to the ViSN teacher by the ViSN mentor (scan completed assessment and email to teacher above) within 24 hours of assessment date (above).

Instructions to Students

1. **ALL** questions should be attempted.
2. Write your answers in the spaces provided in this Question/Answer Booklet.
3. **SHOW ALL YOUR WORKING CLEARLY**. Your working should be sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Correct answers given without supporting reasoning may not be allocated full marks. Incorrect answers given without supporting reasoning cannot be allocated any marks.
4. If you repeat an answer to any question, ensure that you cancel the answers you do not wish to have marked.
5. It is recommended that you **do not use pencil**, except in diagrams.

Question 1 **[1, 3 = 4 marks]**

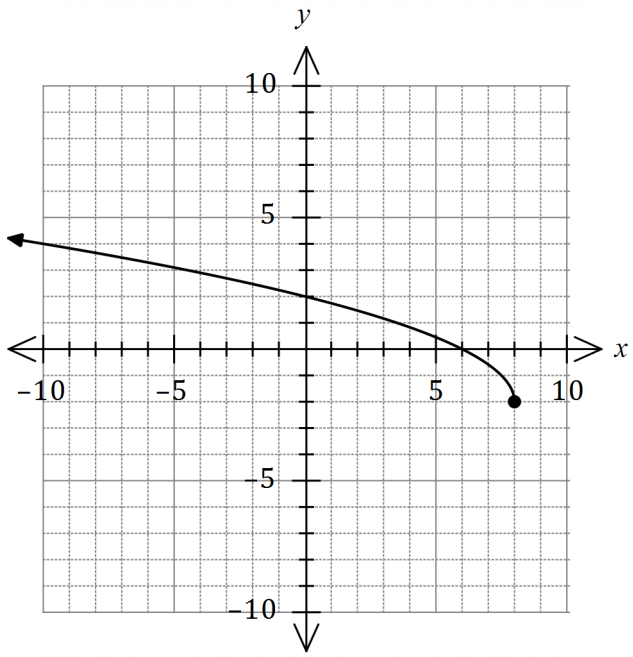
Consider the function $f(x)=(x-2)^2-3$.

(a) Explain why it is necessary to restrict the natural domain of *f(x) so that* its inverse is also a function.

(b) State a minimal restriction to the domain of *f(x)* that includes $x=1$, and then use this restriction to show that $f^{-1}(x)=2-\sqrt{x+3}$.

Question 2 **[3, 3 = 6 marks]**

The graph of $y=f(x)$ is shown below.



(a) Draw the graph of $y=f^{-1}(x)$ on the same axes.

(b) Given that $f(x)=\sqrt{16-2x}-2$, determine the defining rule for $f^{-1}(x)$.

Question 3 **[1, 1, 2, 2 = 6 marks]**

Functions f, g and h are defined as

$$f(x)=x+3, g(x)=\sqrt{x}, h(x)=\frac{4}{2-x}.$$

(a) Determine

(i) $h \circ g \circ f(6)$.

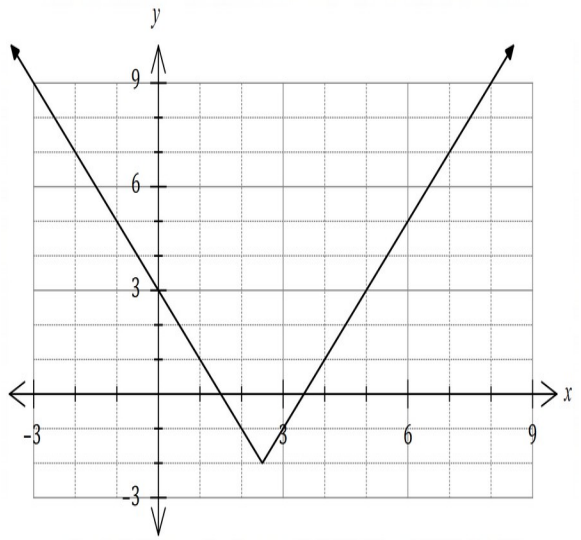
(ii) the defining rule for $h \circ g \circ f(x)$.

(b) Determine the domain of $h \circ g \circ f(x)$.

(c) Determine the range of $h \circ g \circ f(x)$.

Question 4 **[2, 2, 1, 3 = 8 marks]**

The graph of $f(x)=|ax+b|+c$ is shown below.



(a) Using the graph, or otherwise, solve

(i) $f(x)=5.$

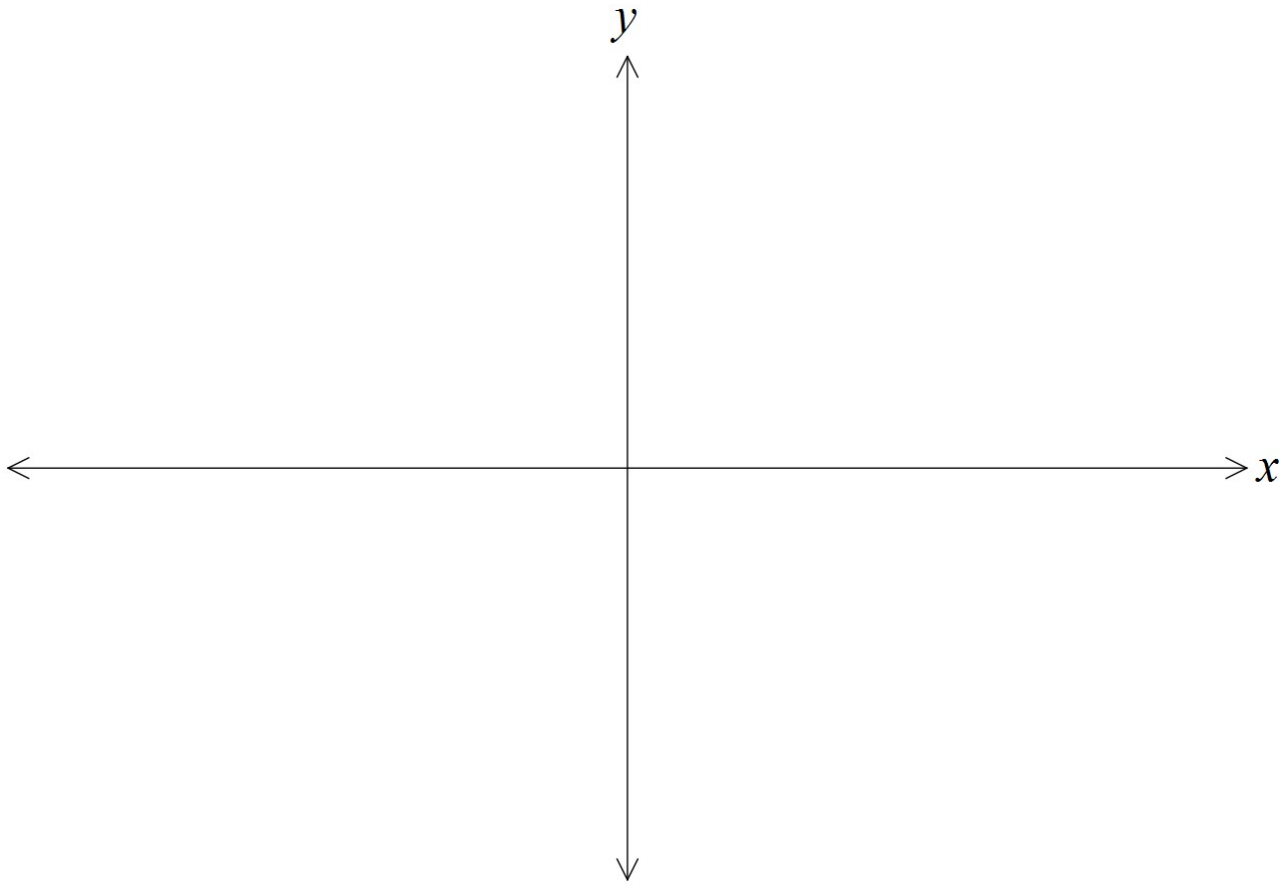
(ii) $f(x)=x.$

(iii) $f(x)+2x=3.$

(b)Determine the values of $a, b, c \in Z.$

Question 5 **[4 marks]**

Let $f(x)=\frac{x^2-4x-2}{x-1}$. Sketch $f(x)$ on the axes provided below.



Question 6 **[1, 1, 2 = 4 marks]**

Let $g(x)=\dfrac{(x-2)(x+3)}{x^2+1}$.

(a) State the equation of the horizontal asymptote of the graph of $y=g(x)$.

(b) State the values of $g(6), g(7)$ and $g(8)$.

(c) Use your previous two answers to explain why the graph of $y=g(x)$ must have a local maximum to the right of $x=7$.

End of Section One

Extra Working Space

Question number: _____

2021 Year 12 ViSN
Mathematics Specialist Unit 3

Test 2 – Functions
Section Two – Calculator Assumed

Mr Daniel Comtesse

Mandurah Catholic College

Calculator Assumed:_____/10

daniel.comtesse@cewa.edu.au

Student Name: _____

School: _____

Time allowed: Section One - 35 minutes

Section Two – 15 minutes

Assessment Date: 22 March 2021

Material required/recommended

To be provided by the supervisor

This Question/Answer Paper

SCSA Formula Sheet

To be provided by the candidate

Standard items: pens, pencils, pencil sharpener, eraser, correction fluid/tape, ruler, highlighters

Special items: scientific and/or CAS calculator, 1 A4 (one sided) page of notes.

Instructions to Students

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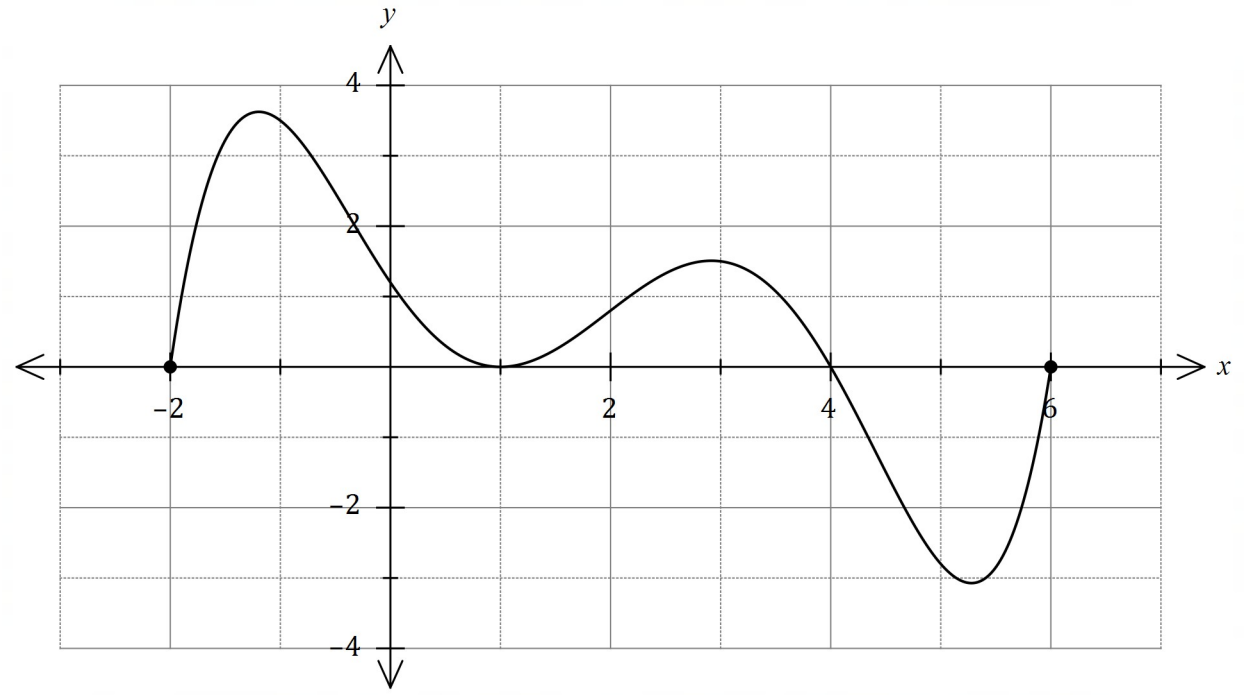
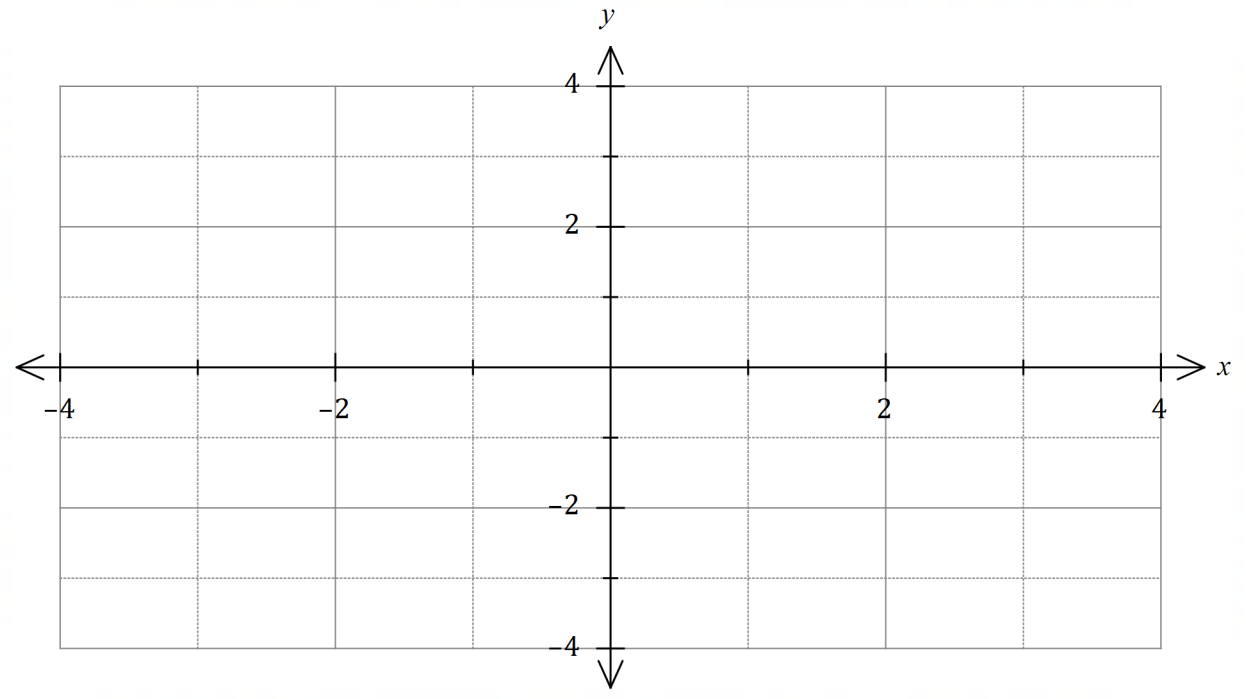
Question 7 **[2, 4, 1 = 7 marks]**

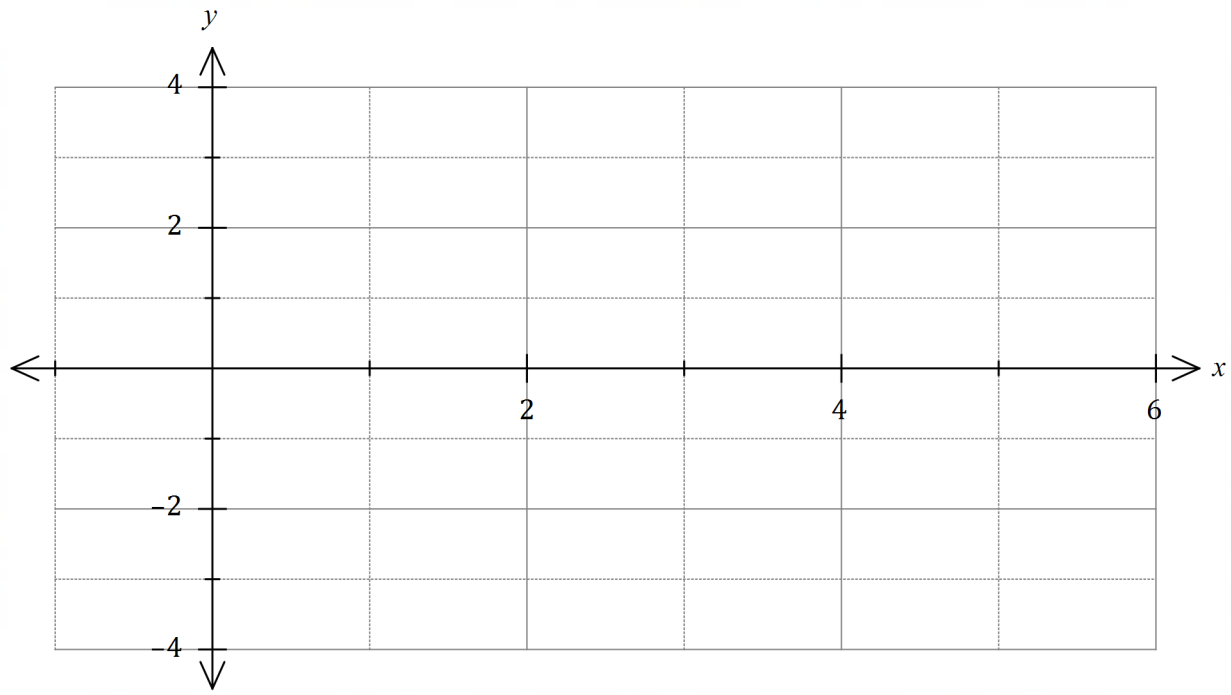
The graph of $y=f(x)$ is shown below over the domain $-2\leq x\leq 6$.



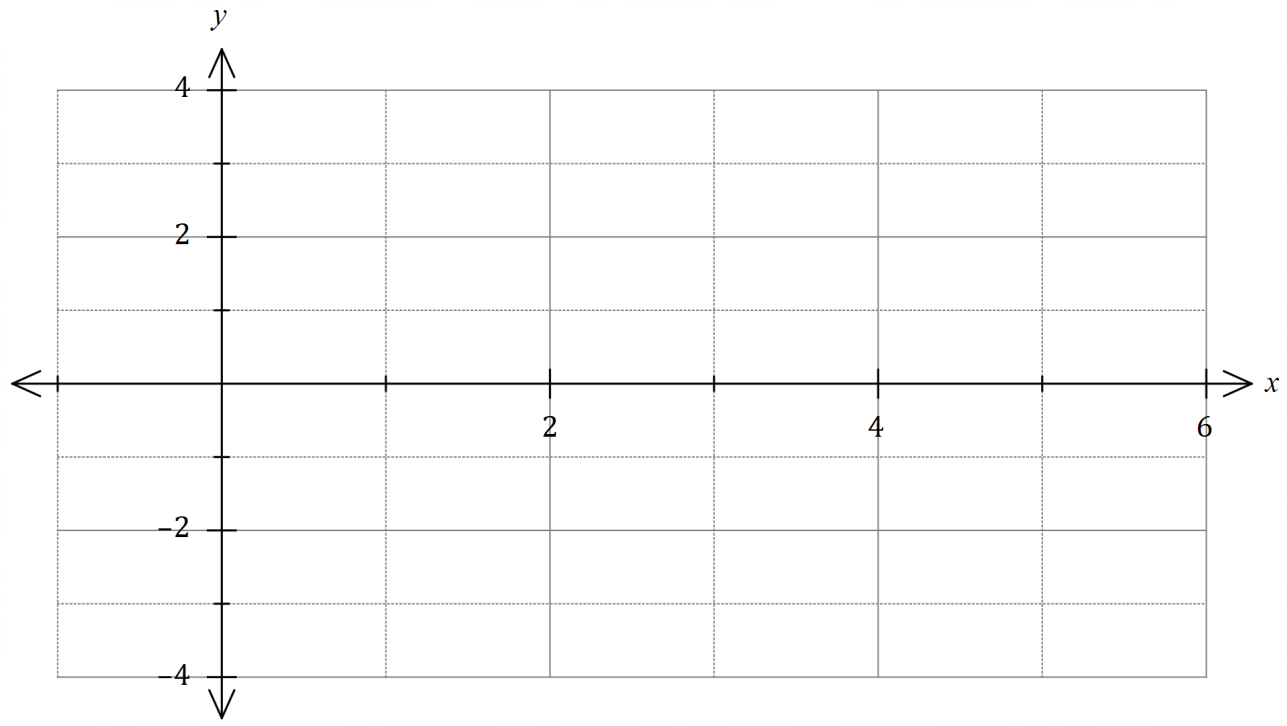
(a) Sketch the graph of $y=f¿$ over the domain $-3\leq x\leq 3$ on the axes below.



(b) Sketch the graph of $y=\dfrac{1}{f(x)}$ on the axes below over the domain $0\le x\le 5$.

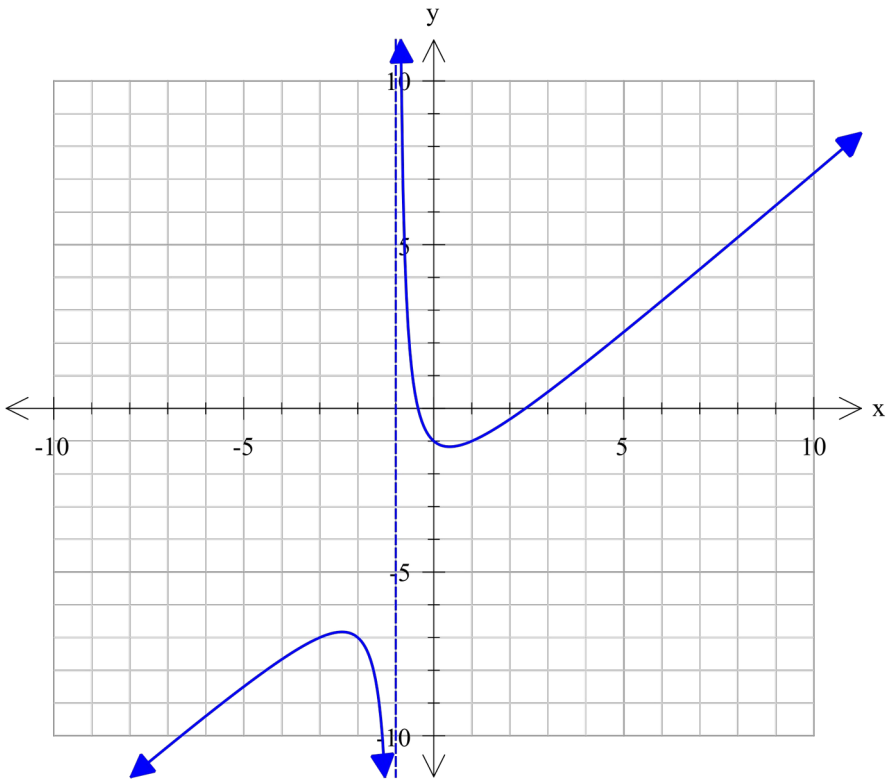


(c) Sketch the graph of $y=\left|f(x)\right|$ on the axes below over the domain $-1\le x\le 6$.



Question 8 **[3 marks]**

The function $f(x)$ is graphed on the axes below with oblique asymptote $y=x-3$. Determine the equation for $f(x)$.



End of Assessment

Extra Working Space

Question number: _____