TRINITY COLLEGE

Mathematics Specialist Units 3 & 4
Test 2 2016

Section 1 Calculator Free

Functions and Sketching Graphs

STUDENT'S NAME: _____

DATE: Thursday 10th March **TIME:** 20 minutes **MARKS**: 23

INSTRUCTIONS:

Standard Items: Pens, pencils, pencil sharper, eraser, correction fluid/tape, ruler, highlighters, Formula Sheet.

Questions or parts of questions worth more than 2 marks require working to be shown to receive full marks.

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1. (23 marks)

For the function $f(x)=\dfrac{x^2-x+1}{x-1}$

(a) Determine $f(0)$. [1]

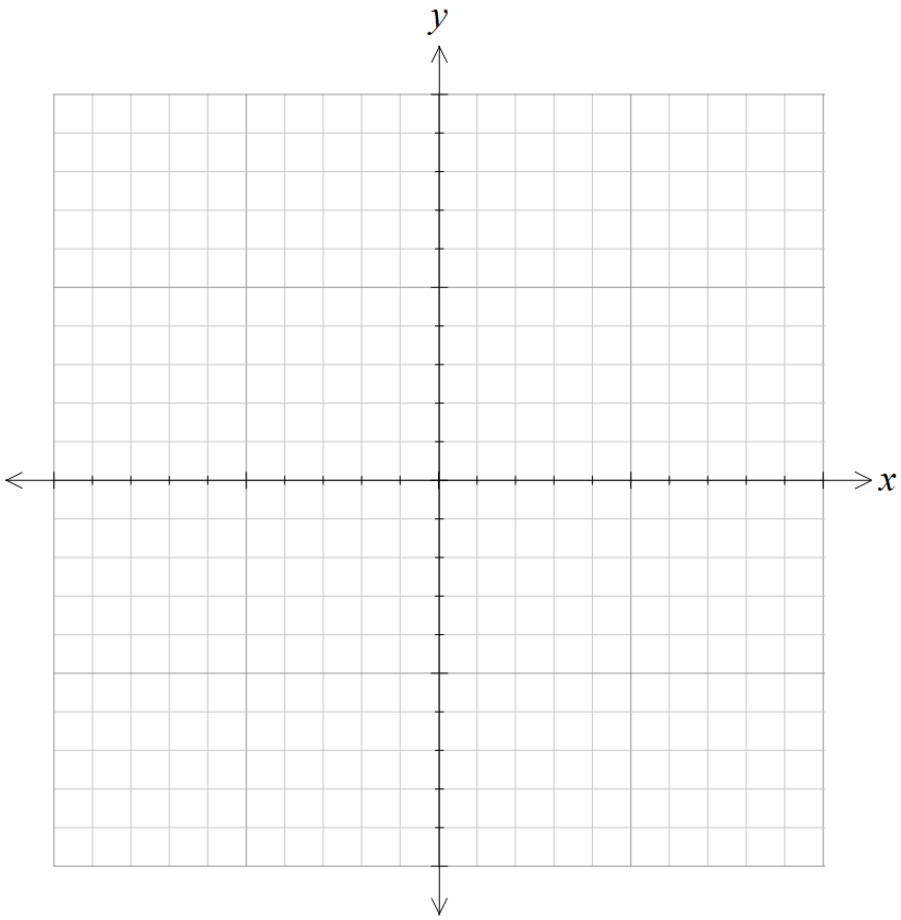
(b) State the domain of the function. [1]

(c) Determine the real roots (zeros) for the equation $f(x)=0$. [2]

(d) Determine the coordinates and nature (max or min) of any turning points. [4]

(e) State any asymptotes for the function. [3]

(f) Sketch the graph of the function, clearly labelling all the above features. [5]



(g) State the range of the function. [2]

(h) What type of relationship is this function? [1]

(i) Graph the inverse relationship on the same set of axes above. [2]

(j) Does $f^{-1}(x)$ exist? If so, why? If not, why not? [2]

End of Questions

TRINITY COLLEGE

Mathematics Specialist Units 3 & 4
Test 2 2016

Section 2 Calculator Assumed

Functions and Sketching Graphs

STUDENT'S NAME: _____

DATE: Thursday 10th March **TIME:** 25 minutes **MARKS**: 27

INSTRUCTIONS:

Standard Items: Pens, pencils, pencil sharper, eraser, correction fluid/tape, ruler, highlighters, Formula Sheet retained from Section 1.

Special Items: Drawing instruments, templates, three calculators, notes on one side of a single A4 page (these notes to be handed in with this assessment).

Questions or parts of questions worth more than 2 marks require working to be shown to receive full marks.

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2. (7 marks)

If $f(x)=\frac{x}{1-\sqrt{x}}$ and $g(x)=9-2x^2$, determine:

(a) The domain and range for $f(x)$. [4]

(b) State the necessary minimum restriction on the natural domain of $g(x)$ so that $y=f(g(x))$ exists. [3]

3. (5 marks)

For the function $f(x)=\left|\frac{2x-1}{x-3}\right|$ where $\frac{1}{2}\le x<3$, determine the inverse function $f^{-1}(x)$.

4. (5 marks)

Given that $f(g(x))=\frac{2}{1-x}$ and $f(x)=\frac{x}{x+1}$, determine the rule for $g(x)$.

5. (10 marks)

The graph below is a pretty good, but not a perfect, representation of the function:

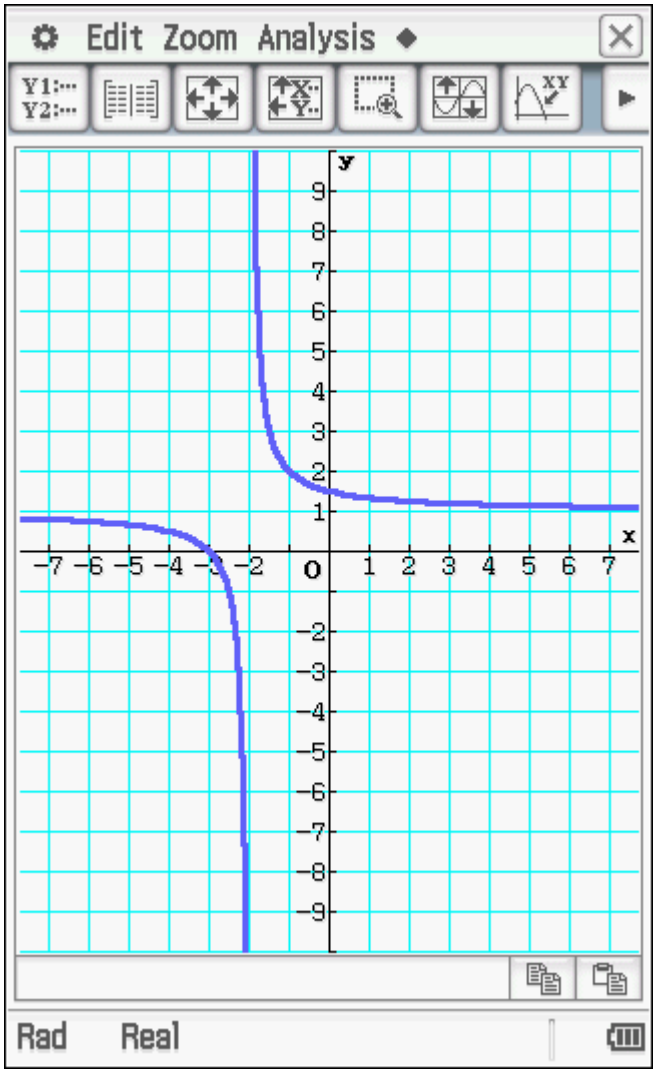
$$f(x)=\frac{x^2+2x-3}{x^2+x-2}$$

(a) Clearly adjust the graph to improve the representation. [2]

(b) On the same set of axes below sketch and label the graphs of:

(i) $y=\dfrac{1}{f(x)}$ [4]

(ii) $y=f\left(|x|\right)$ [4]



End of Questions