Precalculus Sec 3 Test 1: Sep 15, 2008 3:30pm
Instructor: Barry McQuarrie **Name:**

Instructions:

- Attempt all questions.
- The test is out of 100 marks.
- There are 10 questions, 10 marks each.
- You have 60 minutes to complete the test.
- You may use calculators on this test.

Advice:

- Budget your time.
- Do questions which you know how to do immediately first.
- Leave questions which you find difficult until last.
- Ask for clarification if you do not understand a question.
- You must show your work. Label sketches well.

Problem 1. (5+5=10 marks)

(a) Determine the domain of the function $f(x) = \dfrac{4}{\sqrt{8-5x}}$

(b) Given $w(t) = \dfrac{45-8t^2}{\sqrt{8+4t^6}}$, what function does the function $w(t)$ approach as $t \longrightarrow \infty$? (end behaviour)

Problem 2. (10 marks) Draw a <u>well labelled</u> arrow diagram for the addition of two functions, where f has domain A and range B and g has domain D and range R: $(f+g)(x) = f(x) + g(x)$. Clearly indicate in your diagram what the domain of $f+g$ is.

Problem 3. (10 marks) Given $f(x) = \dfrac{x^2 - 2}{3}$, simplify the quantity $f(x+h) - f(x-h)$ as much as possible.

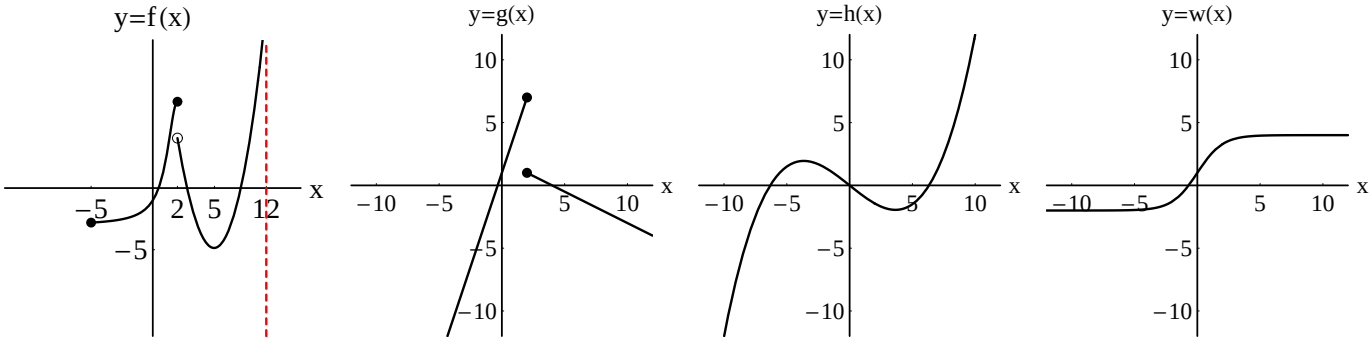
Problem 4. (10 marks) Determine whether the following function is even, odd, or neither. Use the algebraic technique to determine if a function is even or odd, rather than attempting to sketch the function.

$$g(x) = \frac{x^3 - x}{x^4 + 1}$$

Problem 5. (10 marks) Find a formula $f^{-1}(x)$ for the inverse of the function (you do not have to discuss domain and range):

$$f(x) = \frac{1 + 5x}{3 - 2x}$$

Problem 6. ($10 \times 1 = 10$ marks) Answer questions (i)–(x) based on the following graphs.



(i) $f(x)$ is continuous for $x \in [2, 12]$ ..... T F

(ii) $f(x)$ has a vertical asymptote given by $y = 12$ ..... T F

(iii) $f(x)$ is a function with domain $x \in [-5, 12)$ ..... T F

(iv) $f(-5) = 5$ ..... T F

(v) $g(x)$ is not a function ..... T F

(vi) $h(-x) = -h(x)$ ..... T F

(vii) $h(x)$ is an even function ..... T F

(viii) $h(x)$ is a one-to-one function ..... T F

(ix) $w(x)$ is bounded above and bounded below ..... T F

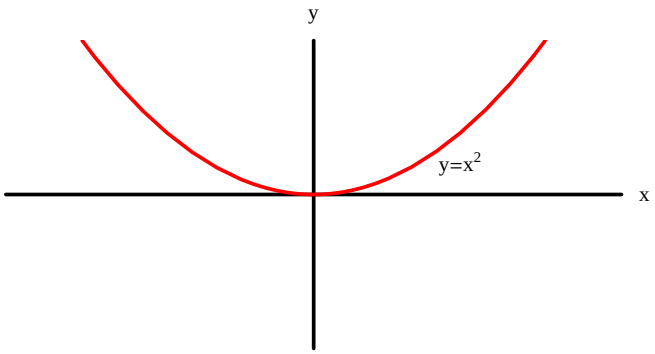
(x) $w(x)$ has two horizontal asymptotes ..... T F

Problem 7. (10 marks) Sketch the graph of the piecewise defined function f, and label three (x, y) ordered pairs on the graph. From your graph, what is the range of f?

$$f(x) = \begin{cases} -2 - 2x & \text{if } x > 0 \\ -|x| & \text{if } x \leq 0 \end{cases}$$

Problem 8. (10 marks) Given the functions $f(x) = x^4 - x^2$ and $g(x) = \sqrt{x^{3/2} - x}$, determine the composition $(f \circ g)(x)$ (simplify as much as possible). You do not have to discuss domains.

Problem 9. (10 marks) Given below is a sketch of the function $f(x) = x^2$. Using what we've learned about translating a graph, draw a sketch of the function $g(x) = (x-1)^2 + 4$ (you can add it directly to the sketch below if you like).



Problem 10. (10 marks) Given below is a sketch of the function $y = f(x)$. Add to this a sketch of the inverse function $y = f^{-1}(x)$. Label one (x, y) ordered pair on the inverse function.