Math 0031 **Midterm Exam 2**

Spring 2017 **Name:** _____

No calculators, no notes, no books are permitted.

SHOW ALL WORK (no work = no credit). Write neatly. Simplify your answers when possible.

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1. (5 points) Suppose that a polynomial function of degree 5 with rational coefficients has the numbers -2, $3+2i$, and $1-\sqrt{6}$ as its zeros. Find the other zero(s).

2. (6 points) Solve the inequality $\dfrac{3}{x-4} \leq \dfrac{1}{x+2}$.

3. Consider the function $f(x) = \dfrac{x^2 - x - 2}{x^2 - 4}$.

(a) (5 points) Determine the domain of the function.

(b) (5 points) Determine the vertical asymptotes of the graph of the function, if any.

(c) (5 points) Determine the horizontal asymptotes of the graph of the function, if any.

(d) (5 points) Determine the oblique asymptotes of the graph of the function, if any.

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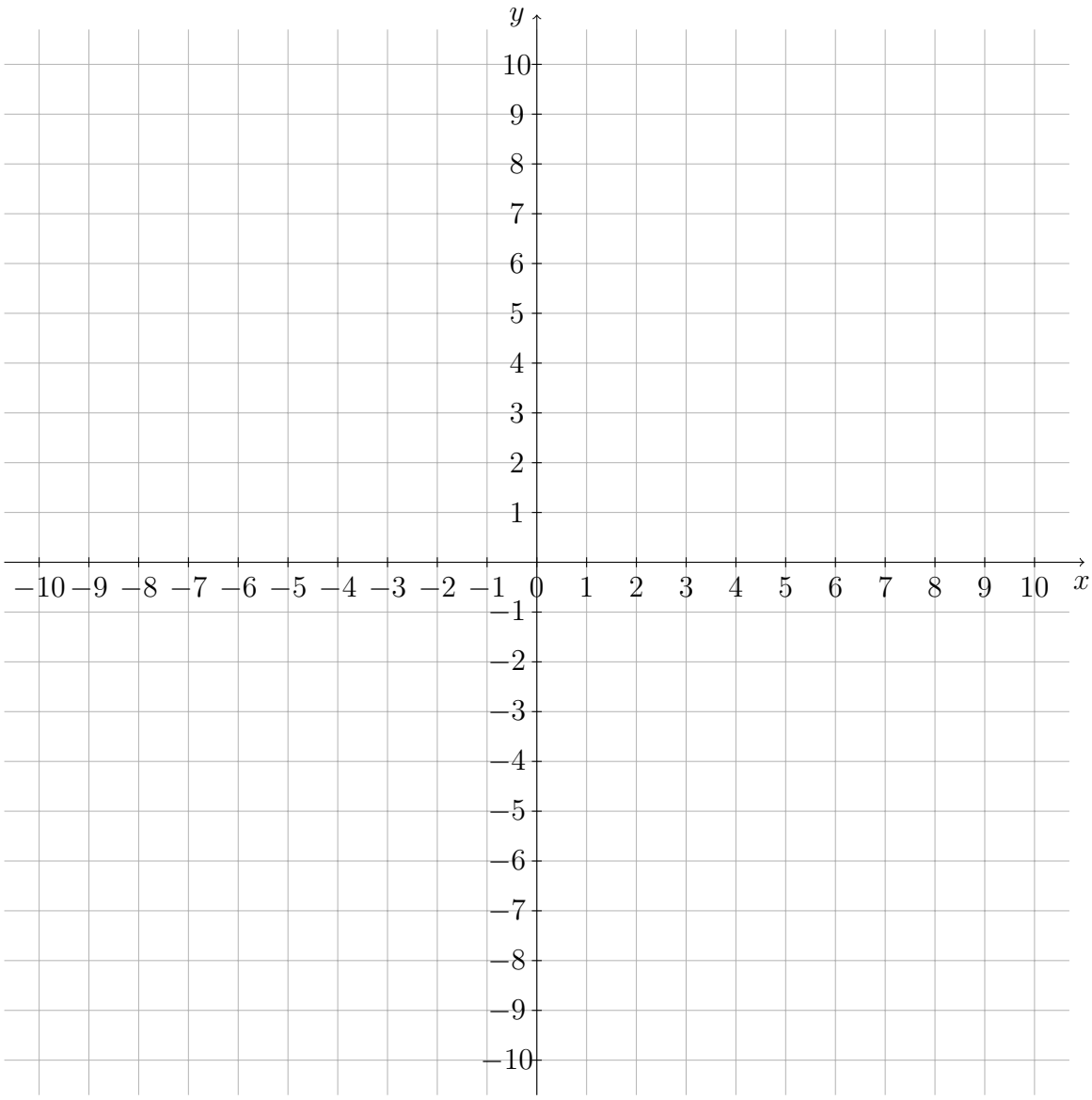
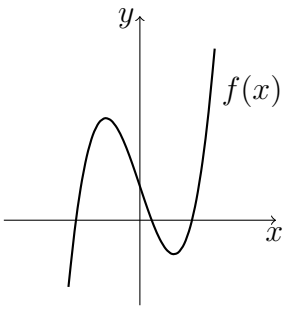
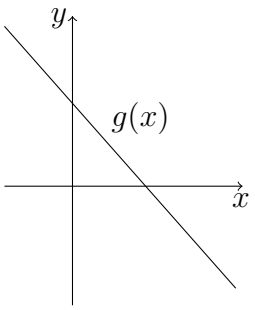
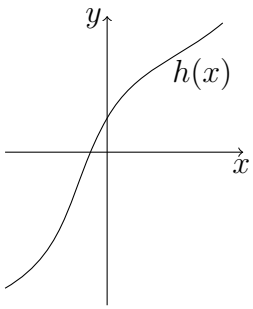
(e) (5 points) Sketch the graph of the function $f(x)$. Draw all asymptotes. Mark the asymptotes and points outside the domain, if any.

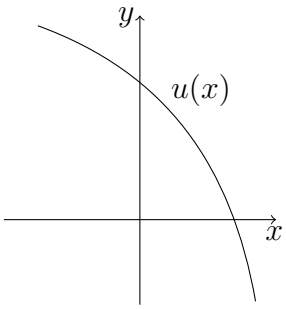


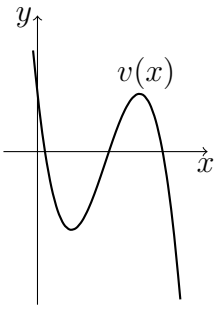
4. (5 points) Graph of the functions $f(x)$, $g(x)$, $h(x)$, $u(x)$, $v(x)$ and $w(x)$ are given

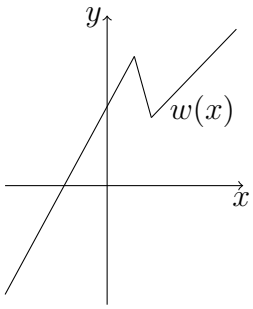












Determine which functions are one-to-one and mark them below:

◯ $f(x)$	◯ $g(x)$	◯ $h(x)$
◯ $u(x)$	◯ $v(x)$	◯ $w(x)$

5. (6 points) The function $f(x) = \left(\frac{x-1}{2}\right)^3$ is one-to-one. Find its inverse.

6. Find

(a) (5 points) $\log 0.001$

(b) (5 points) $\log_8 2$

(c) (5 points) $\log_5 \sqrt[4]{5^3}$

(d) (5 points) $\dfrac{\log_3 8}{\log_3 2}$

7. Simplify

(a) (5 points) $\log_2(16 \cdot 32)$

(b) (5 points) $\ln \frac{a^3}{b} - \ln \frac{a^2}{b^2}$

(c) (5 points) $6 \log x^{3/2} \sqrt[3]{y^5}$

8. Solve equations

(a) (6 points) $4^{3x-7} = 16$

(b) (6 points) $\log_3(x+16) - \log_3 x = 2$

(c) (6 points) $\ln(x+10) - \ln x = \ln 6$