MAC 1147 TEST IIA
FALL 2010

A. Sign your scantron sheet in the white area on the back in ink.

B. Write and code in the spaces indicated:

1) Name (last name, first initial, middle initial)

2) UF ID number

3) Discussion section number

C. Under "special codes" code in the test ID numbers 2, 1.

1 ● 3 4 5 6 7 8 9 0

● 2 3 4 5 6 7 8 9 0

D. At the top right of your answer sheet, for "Test Form Code" encode A.

● B C D E

E. While taking the test, please keep your answer sheet covered or turned over at all times.

F. This test consists of 6 three-point multiple choice questions and 8 five-point multiple choice questions and four pages of partial credit questions worth 25 points. The time allowed is 90 minutes.

G. WHEN YOU ARE FINISHED:

1) Before turning in your test check for transcribing errors. Any mistakes you leave in are there to stay.

2) You must turn in your scantron and tear off sheets to your discussion leader. Be prepared to show your picture I.D. with a legible signature.

3) The answers will be posted after the exam on the web www.math.ufl.edu/~huang/MAC1147.html.

NOTE: Be sure to bubble the answers to questions 1–14 on your scantron.

Part I: 3 points each

1. If the point $(2, -1)$ is on the graph of $y = f(x)$, which point must be on the graph of $y = -f(x+1) + 2$?

a. $(1, 3)$ b. $(1, -1)$ c. $(3, 3)$ d. $(3, -1)$

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2. If $f(x) = \sqrt{2+x}$, find the range of f^{-1}.

a. $(-\infty, \infty)$ b. $[0, \infty)$ c. $[-2, \infty)$ d. $(-\infty, -2]$

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3. $i^{98} + \dfrac{1}{i} =$ _____

a. $1+i$ b. $1-i$ c. $-1+i$ d. $-1-i$

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4. Find the axis of symmetry of the quadratic function $y = -\dfrac{1}{4}x^2 + 5x + 4$.

a. $x = -\dfrac{5}{2}$ b. $x = \dfrac{5}{2}$ c. $x = -10$ d. $x = 10$

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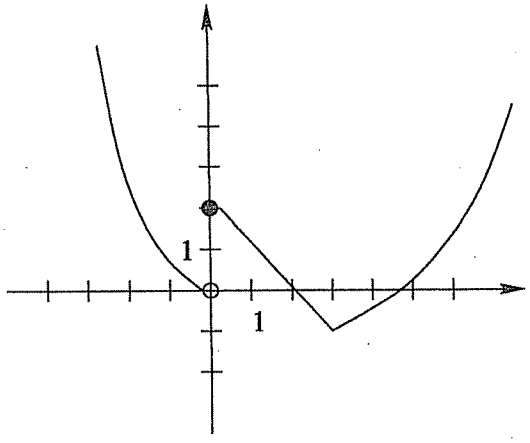
5. Find the zeros of the rational function $f(x) = \dfrac{(x-1)(x^2-4)(x-5)}{(x+1)^2(x-2)}$.

a. $x = -2, -1, 2, 5$ only b. $x = -2, 5$ only

c. $x = -1, 2$ only d. $x = 5$ only

6. **(BONUS!)** Given the graph of $y = f(x)$ below. Which of the following is correct?



a. f is increasing on $(-1, \infty)$.

b. f is one-to-one.

c. f has the local minimum value -1.

d. $f(0) = 0$

Part II: 5 points each

7. If $f(x) = \dfrac{1}{x-1}$ and $g(x) = \dfrac{1}{x+2}$, find $(f \circ g)$ and its domain.

a. $(f \circ g)(x) = \dfrac{1}{(x-1)(x+2)}$; domain: $x \neq -2$ and $x \neq 1$

b. $(f \circ g)(x) = \dfrac{x+2}{-x+3}$; domain: $x \neq -3$

c. $(f \circ g)(x) = \dfrac{x+2}{-x+3}$; domain: $x \neq -3$ and $x \neq -2$

d. $(f \circ g)(x) = \dfrac{x+2}{-x-1}$; domain: $x \neq -1$

e. $(f \circ g)(x) = \dfrac{x+2}{-x-1}$; domain: $x \neq -2$ and $x \neq -1$

8. Find a polynomial of degree 3 with zeros $2+i$ and 3.

a. $x^3 - x^2 - 7x + 15$ b. $x^3 - 7x^2 + 17x - 15$

c. $x^3 - 5x^2 + 9x - 5$ d. $x^3 - 3x^2 + x - 3$

e. $x^3 - 2x^2 - 2x - 3$

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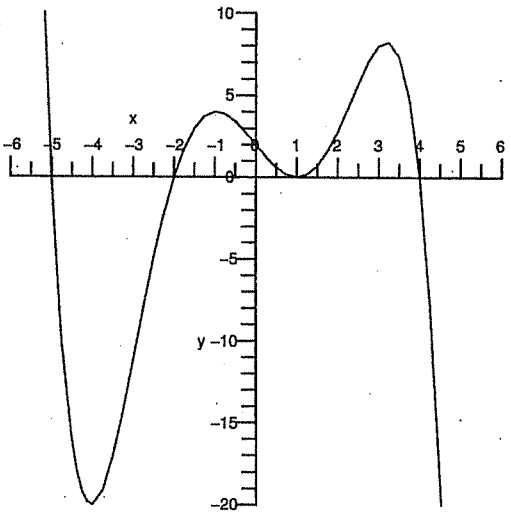
9. Given the graph of the polynomial function $y = f(x)$ below. Which of the following is/are correct?

P. The degree of f is odd.

Q. The leading coefficient of f is positive.

R. The function f has only one real zero with an even multiplicity.



a. P only b. Q and R only c. R only

d. P and Q only e. P and R only

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10. If $f(x) = \dfrac{1}{x+2}$ and $g(x) = x^2 - 5,\ x \leq 0$, find $(f \circ g^{-1})(4)$.

a. -1 b. 1 c. $\dfrac{1}{9}$ d. $\dfrac{1}{5}$ e. $\dfrac{1}{11}$

11. Which of the following is/are correct?

P. $\sqrt{2}$ is <u>not</u> a complex number.

Q. The complex conjugate of 2 is -2.

R. $\sqrt{-2} \cdot \sqrt{-8} = -4$

a. P only b. Q only c. R only

d. Q and R only e. P and R only

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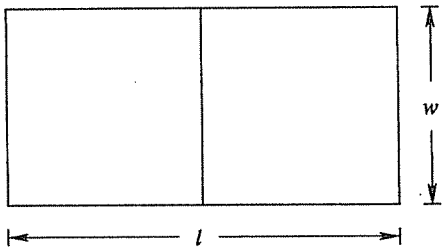
12. A farmer has 100 feet of fencing available to build a rectangular area for his hens and roosters. He wants to separate the hens and roosters by dividing the area into two equal pens. Find the largest possible total area of the two pens.



a. 400 square feet b. 500 square feet c. 625 square feet

d. $\frac{2500}{3}$ square feet e. $\frac{1250}{3}$ square feet

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13. Which of the following is/are correct for the graph of the rational function $f(x) = \dfrac{x^2 - x - 2}{4 - x^2}$?

P. $f(x)$ has two vertical asymptotes $x = -2$ and $x = 2$.

Q. $f(x)$ has one horizontal asymptote $y = -1$.

R. The graph of f crosses its horizontal asymptote at $x = 2$.

a. P only b. Q only c. P and R only

d. Q and R only e. P, Q and R

14. Given the x-intercepts -1, 3 and y-intercept -6 of the quadratic function $y = f(x)$. Find the vertex of f.

a. $(1, -7)$ b. $(1, -8)$ c. $(1, -9)$

d. $(1, -10)$ e. $(1, -11)$

MAC 1147 TEST IIA PART II
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Sect # _____ Name _____

UF ID _____ Signature _____

SHOW ALL WORK TO RECEIVE FULL CREDIT.

1. Suppose that f is a one-to-one odd function such that the point $(-1, 2)$ lies one the graph of $y = f(x)$ and $g(x) = \dfrac{x}{4x+1}$.

a) Find $g^{-1}(x)$.

$g^{-1}(x) =$ _____

b) $f^{-1}(-2) =$ _____

c) Find $(g^{-1} \circ f^{-1})(-2)$.

$(g^{-1} \circ f^{-1})(-2) =$ _____

2. Write $\dfrac{1+2i}{3-2i}$ in the standard form

3. Given $f(x) = x^4 + 2x^3 - 2x^2 + 2x - 3$.

a) Use the long division to show that (x^2+1) is a factor of $f(x)$.

b) Find all the zeros of $f(x)$ in the complex number system.

zeros: _____

4. Given a rational function $f(x) = \dfrac{x^2 - 4x + 3}{x^2 + 2x + 1}$.

a) Find the following (if none, write "none")

1) domain of f _____

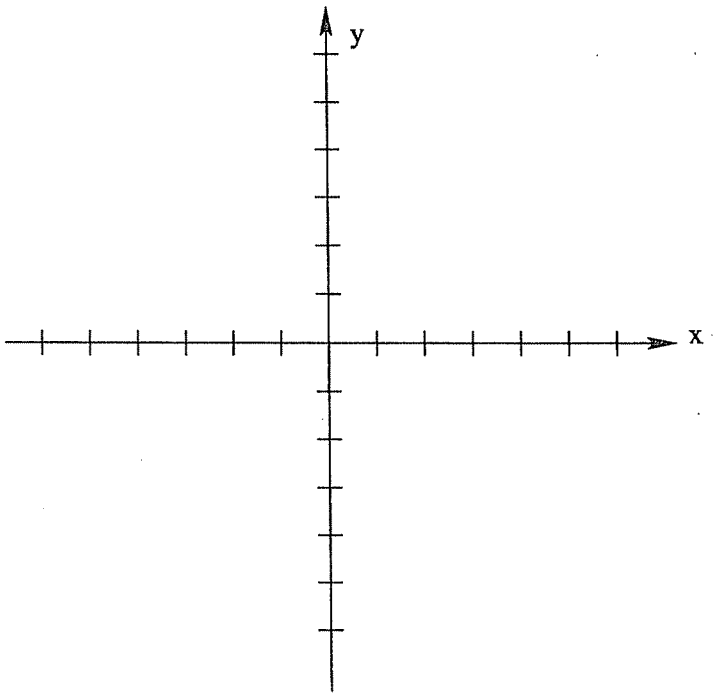
2) equation of the vertical asymptote(s) _____

3) equation of the horizontal asymptote _____

4) The graph crosses its horizontal asymptote at $x =$_____.

5) x-intercept(s): $x =$_____; y-intercept(s): $y =$_____

b) Sketch the graph (indicate any asymptotes, holes, x-intercepts and y-intercepts on your graph).



5. A company has been selling an average of 100 units of a certain product daily at the price of \$40 each. A market survey indicates that for each \$2 price decrease, the number of units sold will increase by 5 daily.

a) Express price per unit p in terms of demand x. (Assume that the relation between x and p is linear.)

$p =$ _____

b) Express revenue R in terms of x.

$R =$ _____

c) Find the maximum revenue.

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