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

1. Find the inverse of $f(x) = x^2 - 9$ and state the domain of $f^{-1}(x)$ if possible.

a. $f^{-1}(x) = \sqrt{x+9}$, Domain: $[-9, \infty)$
b. $f^{-1}(x) = \pm\sqrt{x+9}$, Domain: $[-9, \infty)$
c. $f^{-1}(x) = \sqrt{x+9}$, Domain: $(-\infty, \infty)$
d. $f^{-1}(x) = \pm\sqrt{x+9}$, Domain: $(-\infty, \infty)$
e. Not possible

2. Solve: $\ln(5+x) - \ln(x-2) = \ln(4)$.

a. No solution   b. $\left\{\dfrac{13}{3}\right\}$ c. $\left\{\dfrac{13}{3}, \dfrac{15}{7}\right\}$ d. $\left\{\dfrac{15}{7}\right\}$

e. $\left\{\dfrac{12}{5}, \dfrac{15}{7}\right\}$

3. Solve: $\log_3\left(\dfrac{1}{81}\right) = x$.

a. 3   b. -3 c. No solution   d. 4   e. -4

4. A grocery store sells a name brand energy drink for $5. They also sell a generic brand of energy drink for $2. If they sold a total of 100 drinks and made $410, how many of the name brand did they sell?

a. 50   b. 30   c. 70   d. No solution

5. Find $(f \circ g)(x)$ and its domain, given $f(x) = \dfrac{1}{\sqrt{x+4}}$ and $g(x) = x^2$.

a. $(f \circ g)(x) = \dfrac{1}{x+2}$, Domain: $(-\infty, -2) \cup (-2, \infty)$

b. $(f \circ g)(x) = \dfrac{1}{\sqrt{x^2+4}}$, Domain: $(-\infty, -2) \cup (2, \infty)$

c. $(f \circ g)(x) = \dfrac{1}{x+2}$, Domain: $(-\infty, \infty)$

d. $(f \circ g)(x) = \dfrac{1}{\sqrt{x^2+4}}$, Domain: $(-\infty, \infty)$

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6. Solve: $\left(\dfrac{1}{4}\right)^{-(6-2x)} = 16$.

a. 4   b. -8 c. -2 d. 2   e. 8

---

7. Find inverse of $f(x) = e^{-x} + 2$ and state the domain of $f^{-1}(x)$ if possible.

a. $f^{-1}(x) = -\ln(x-2)$, Domain: $(2, \infty)$
b. $f^{-1}(x) = -\ln(x) + 2$, Domain: $(0, \infty)$
c. $f^{-1}(x) = -\log(x-2)$, Domain: $(2, \infty)$
d. Not possible
e. $f^{-1}(x) = -\log(x) + 2$, Domain: $(0, \infty)$

---

8. Find $f - g$ given $f(x) = -2x^2 + 4$ and $g(x) = 2(-x^2 + 2)$.

a. $-4x^2$ b. 8   c. 0   d. Undefined

For questions **9 and 10**, consider the following problem: A population is increasing according to the function $y = 2e^{\frac{1}{2}t}$, where y represents the population and t represents time in years.

9. How long will it take for the population to triple?

a. $2\ln(2)$ years.
b. Not enough information.
c. $2\ln(3)$ years.
d. $\frac{1}{2}\ln(3)$ years.
e. $2e^2$ years

---

10. What will the population be in 4 years?

a. Not enough information.
b. $2e^4$
c. $2e^2$
d. $2\ln(2)$

Complete the exam problems first before attempting the bonus.

11. (Bonus) Which of the following is an example of a function that does **NOT** have an inverse?

a. $f(x) = \sqrt{x}$

b. $f(x) = \ln(x)$

c. $f(x) = \dfrac{x}{(x-1)^2}$

d. All of these.

e. None of these.

12. (Bonus) In order to find the domain of a rational function you must first reduce it to lowest terms.

a. True

b. False

c. Not enough information to establish if the statement is true or false.

13. (Bonus) You are investing money into two separate accounts. Account 1 is compounded continuously with a rate of 4% and account 2 is compounded annually with a rate of 5%. You invest 3 times the amount of money into account 1 than invested into account 2. How much money did you invest into each account?

a. Account 1: $900, Account 2: $300

b. Account 1: $600, Account 2: $200

c. Account 1: $1200, Account 2: $400

d. Not enough information

e. No solution

14. (Bonus) Identify the true statement about the relation: $y = \dfrac{x-1}{x^2-1}$.

a. The relation is a one-to-one function

b. The domain of the relation is $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$

c. The relation has a vertical asymptote at $x = -1$ and a hole at $x = 1$

d. None are true

e. All are true

5B

MAC 1105 Exam 3B, Part II Free Response

Name: _____ UF ID #: _____

Signature: _____ Section #: _____

CLEARLY SHOW ALL WORK TO RECEIVE FULL CREDIT

1. (6 points) Consider the polynomial function: $f(x) = (x^2 - 4x + 4)(x^2 + 3x + 2)$. **Express answers a-b) as ordered pairs.**

a) Find the zero(s) of $f(x)$.

Answer: _____

b) Find the y-intercept of $f(x)$.   Answer: _____

c) Describe the behavior at each zero. (i.e. does the graph cross or touch the axis?)

d) Describe the end behavior of $f(x)$. You may draw a picture.

e) Sketch the graph of $f(x)$. Be sure to **label** the points you found above.

2. (4 points) Consider the rational function: $f(x) = \dfrac{(2x-3)(x+1)}{(x+1)(x-2)}$.

a) Find the domain of $f(x)$. Express in interval notation.

Answer: _____

b) Give the equation of the vertical asymptote(s) of $f(x)$.

Answer: _____

c) Find the hole of $f(x)$ if possible. Write answer as an ordered pair or write none.

Answer: _____

d) Give the equation of the horizontal asymptote of $f(x)$ if applicable.

Answer: _____

e) (**Bonus**) Sketch the graph of $f(x)$. Be sure to include and **label** all intercepts, asymptotes, and hole.

8B