UF | UNIVERSITY *of*
FLORIDA

Department of Mathematics

MAC 1140
Exam 1D
Fall 2019

A. Sign your bubble sheet on the back at the bottom <u>in ink</u>.

B. In pencil, write and encode in the spaces indicated:

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

    2) UF ID number

    3) Section number

C. Under "special codes" code in the test ID numbers as shown below.

    ● 2 3 4 5 6 7 8 9 0

    1 2 3 ● 5 6 7 8 9 0

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

    A   B   C   ●   E

E. 1) The time allowed is 90 minutes.

    2) You may write on the test.

    3) Raise your hand if you need more scratch paper or if you have a problem with your test. DO NOT LEAVE YOUR SEAT UNLESS YOU ARE FINISHED WITH THE TEST.

F. KEEP YOUR BUBBLE SHEET COVERED AT ALL TIMES.

G. When you are finished:

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

    2) You must turn in your scantron and tearoff sheets to your discussion leader or exam proctor. Be prepared to show your picture <u>I.D. with a legible signature</u>.

    3) The answers will be posted in Canvas within one day after the exam. Your discussion leader will return your tearoff sheet with your exam score in discussion. Your score will also be posted in Canvas within one week of the exam.

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1. If $f(x) = -4x^2 + 2x - 1$ and $g(x) = 8x - 4$. What is $(g \circ f)(x)$?
   A) $-\frac{4x^2 - 2x + 1}{4(2x-1)}$ B) $-32x^2 + 16x - 12$ C) $-256x^2 + 272x - 73$
   D) $-4x^2 + 10x - 5$ E) $-32x^3 + 32x^2 - 16x + 4$

2. What is $((2) \cdot f + (-5) \cdot g)(x)$?
   A) $-12800x^2 + 12640x - 3122$ B) $-8x^2 - 36x + 18$ C) $20x^2 + 6x - 3$
   D) $320x^2 - 160x + 100$ E) $320x^3 - 320x^2 + 160x - 40$

3. When someone calls you and they are in your contacts, your phone uses their phone number to display their name. What are the domain and codomain of this relationship?

   A) Domain: phone numbers in your contacts; Codomain: names
   B) Domain: names in your contacts; Codomain: phone numbers
   C) Domain: phone numbers; Codomain: names
   D) Domain: names; Codomain: phone numbers

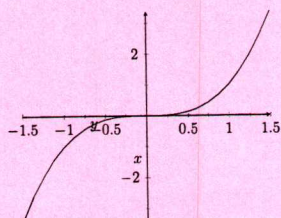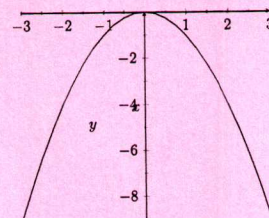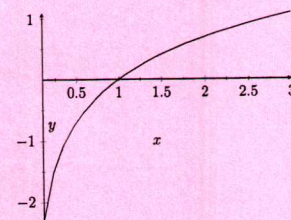4. Which of the following has an absolute maximum?
   A)

   B)

   C)

   D)

   E)
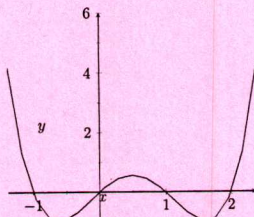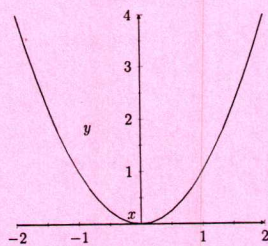
5. Which coordinates describe a point that is 8 units down and 5 units to the right of the origin?
   A) $(5, 8)$ B) $(-8, 5)$ C) $(-5, -8)$ D) $(5, -8)$ E) $(8, -5)$

6. The function $f(x)$ is transformed and the points $(-3, 3)$ and $(1, -1)$ on the graph of f are sent to the points $(\frac{1}{2}, 8)$ and $(\frac{3}{2}, -8)$ respectively. Which of following expressions could describe the transformations applied to $f(x)$?
   A) $(-4)f(4x - 5) + (4)$ B) $(4)f(4x - 5) + (-4)$
   C) $(4)f(4x + 5) + (-4)$ D) $(4)f(4x - 20) + (-4)$ E) $(4)f(4x - 5) + (-16)$

7. Suppose $f(x)$ has a zero at an x-value of 4.
   What would a zero of $g(x)$ be if $g(x) = 3f(-3x + 1)$?
   **A)** -1 **B)** 4   **C)** -11 **D)** -3 **E)** 1

8. You are reviewing a model your company has to calculate the cost to modify one of your software packages for individual usage. You need to update the model due to inflation and changes in the industry, and you have developed a transform that does exactly this. In particular, the updated cost is calculated by $U(x) = 5.80C(x) - 210$, where $C(x)$ is the original cost. If a customer had originally been quoted a cost of \$700 for modifying 2 software packages, what would the updated cost be?
   A) \$157.   **B)** \$1920.   **C)** \$314.   **D)** \$7700.   **E)** \$3850.

9. Which of the following graphs depicts a continuous relationship?

A)

B)

C)

D)

E)

4   Form D
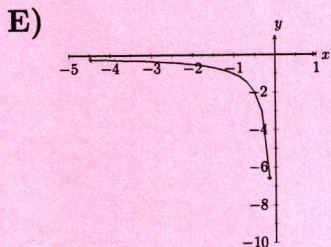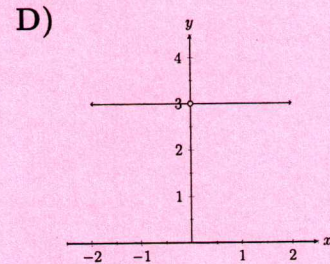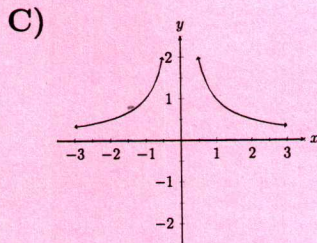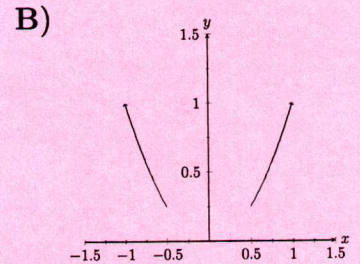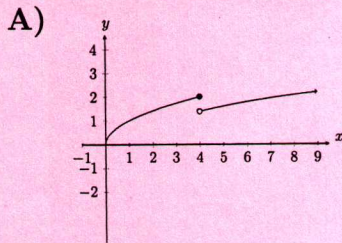
10. Which of the following accurately describes the sequence of transformations applied to $f(x)$ to obtain $-2f(-4(x+8))+(10)$?

   A) The function f is flipped over the y-axis, horizontally stretched to $\frac{1}{2}$ its original width, shifted left by 10, vertically stretched by a factor of 4, flipped over the x-axis, and shifted up by 8.

   B) The function f is flipped over the y-axis, horizontally stretched to $\frac{1}{2}$ its original width, shifted left by 10, vertically stretched by a factor of 4, flipped over the x-axis, and shifted up by 8.

   C) The function f is flipped over the y-axis, horizontally stretched to $\frac{1}{4}$ its original width, shifted left by 8, vertically stretched by a factor of 2, flipped over the x-axis, and shifted up by 10.

   D) The function f is flipped over the y-axis, horizontally stretched to $\frac{1}{4}$ its original width, shifted left by 8, vertically stretched by a factor of 2, flipped over the x-axis, and shifted up by 10.

   E) The function f is flipped over the y-axis, horizontally stretched to $\frac{1}{4}$ its original width, shifted left by 8, vertically stretched by a factor of 2, flipped over the x-axis, and shifted up by 10.

11. Which equation accurately reflects the following sequence of transformations? The function $g(x)$ is reflected over the y-axis, horizontally stretched by a factor of 3 and shifted up by 4 units.

   A) $g(-\frac{1}{3}x)+4$ **B)** $g(-3x)+4$ **C)** $g(\frac{1}{3}x)+4$ **D)** $-g(3x)+4$
   E) $-3g(x)-4$

12. Which of the following graphs would most properly be said to have the parent function $f(x) = e^x$?
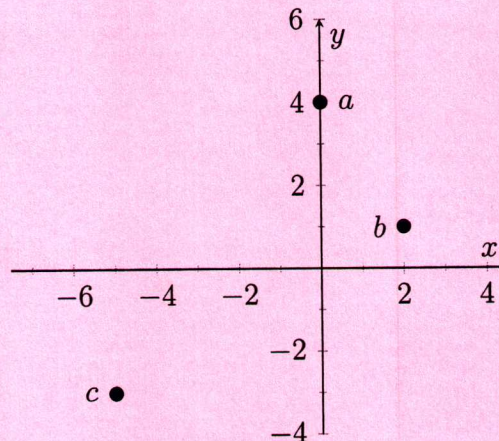
   A)

   B)

   C)

   D)

   E)
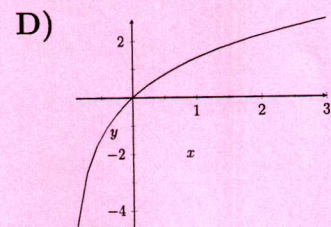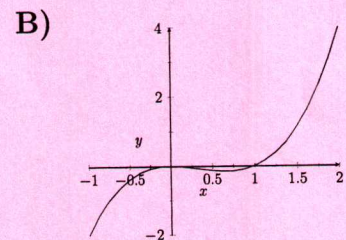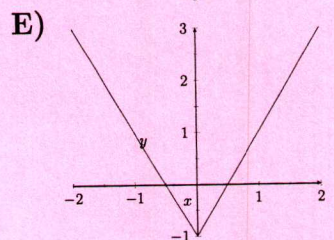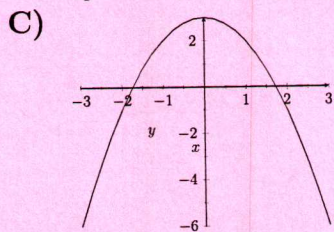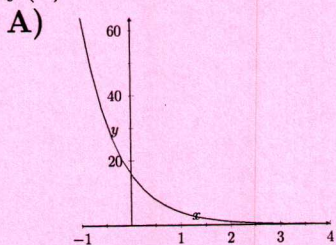
13. Given: $f(3) = 3,$ $f(-2) = 0,$ $g(-2) = 7,$ $g(-4) = 3$ Compute:

    a. $(fg)(-2)$

    b. $(f \circ g)(-4)$

    c. $(f - g)(-2)$

   A) $(fg)(-2) = 3, (f \circ g)(-4) = -7, (f - g)(-2) = -7$
   B) $(fg)(-2) = 3, (f \circ g)(-4) = 3, (f - g)(-2) = 7$
   C) $(fg)(-2) = 3, (f \circ g)(-4) = 3, (f - g)(-2) = -7$
   D) $(fg)(-2) = 0, (f \circ g)(-4) = 3, (f - g)(-2) = 7$
   E) $(fg)(-2) = 0, (f \circ g)(-4) = 3, (f - g)(-2) = -7$

14. Identify the coordinates of the points shown on the graph.

   A) a: (4,0); b: (1,2); c: (-3,-5)   **B)** a: (-4,0); b: (-1,2); c: (-3, 5)
   C) a: (0,-4); b: (-2,-1); c: (5, 3)   **D)** a: (0,4); b: (-2,1); c: (5, -3)
   E) a: (0,4); b: (2,1); c: (-5, -3)

15. If the point $(2, 1)$ is on the graph of $f(x)$, then which point is on the graph of $g^{-1}(x)$ (the graph of g inverse) where $g(x) = -2f(-x - 7) + 2$?
   A) (0,-9)   **B)** (-2, -8)   **C)** (-8, -2)   **D)** (1,2)   **E)** (-9,0)
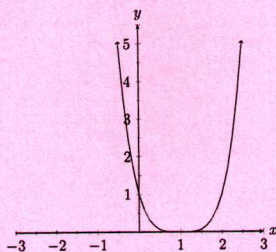
Name: _____   **Section:** _____

Signature: _____   **UFID:** _____

YOU MUST SHOW ALL WORK TO GET CREDIT!

1) Consider the following graph of a function, $f(x)$ (Note: $f(x)$ is **not** x^2):

Graph of function $f(x)$

Define the function $g(x)$ to be the transformation and translation of $f(x)$ defined by:

$$g(x) = 2f(-x+3) - 1$$

(a) Graph $g(x)$ on the axis given (you may attach any scratch paper of steps in graphing if you wish). **You CANNOT use an analytic version of $g(x)$!**, you must graph using translations and/or transformations.

Graph of $g(x)$
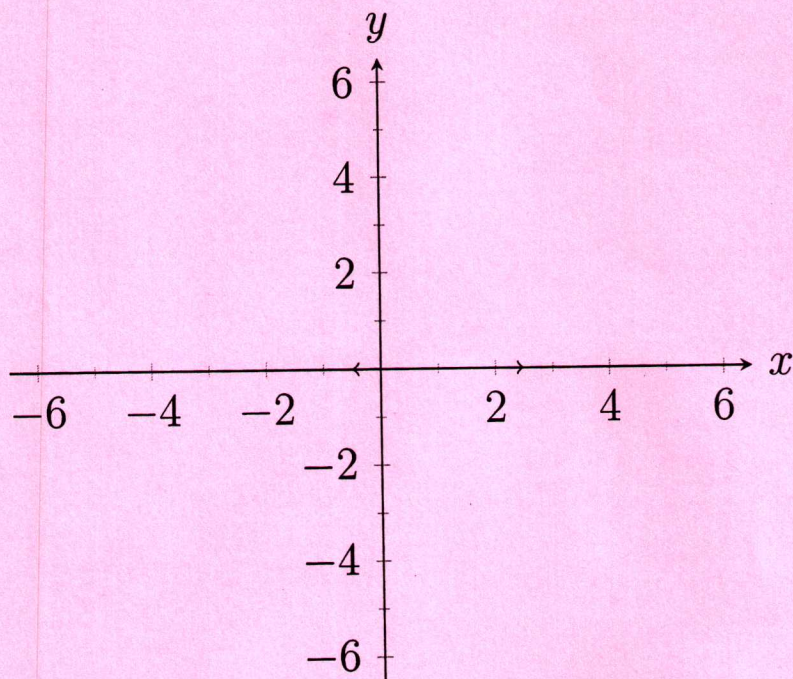
Name: **Section:**

(b) Suppose $f(x)$ is a function, and consider $g(x) = 2f(-x+3) - 1$. If the point $(0, 1)$ is on the graph of $f(x)$, then what point can you conclude *must* be on the graph of $g(x)$?

(c) Using the same $g(x) = 2f(-x + 3) - 1$ as in the last problem; if the point $(4, -1)$ is a point on the graph of $g(x)$, then what point can you conclude *must* be on the graph of $f(x)$?