CSC 108H1 F 2008 Test 1
Duration — 35 minutes
Aids allowed: none

Student Number: └─┴─┴─┴─┴─┴─┴─┴─┴─┘

Lab day, time, room: _____

Last Name: _____   **First Name:** _____

Lecture Section: L0101   **Instructor: Gries**

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*Do **not** turn this page until you have received the signal to start.*
(Please fill out the identification section above, **write your name on the back
of the test**, and read the instructions below.)
Good Luck!

This midterm consists of 3 questions on 8 pages (including this one). *When
you receive the signal to start, please make sure that your copy is complete.*
Comments are not required except where indicated, although they may help
us mark your answers. They may also get you part marks if you can't figure
out how to write the code.
If you use any space for rough work, indicate clearly what you want marked.

1: _____/ 5

2: _____/ 7

3: _____/ 8

TOTAL: _____/20

Question 1.   [5 marks]

Complete the following function according to its docstring description.

```python
def modify_colors(pic):
    '''Modify the Picture pic so that any white pixels are replaced with
    blue and any black pixels are replaced with white.  Pixels of any other
    colour remain unchanged.'''
```

Question 2.　　[7 MARKS]

In the code below, a picture is created and the function `mysterious` is called:

```
if __name__ == '__main__':
    pic = media.create_picture(2, 2)
    pix = media.get_pixel(pic, 0, 0)
    media.set_color(pix, media.hotpink)
    pix = media.get_pixel(pic, 1, 0)
    media.set_color(pix, media.firebrick)
    mysterious(pic)
```

Based on the call to `mysterious` using the picture above, trace the variable values during execution of the function `mysterious`. For each blank in the table below, fill in the value of the variable specified after the line has executed or write "not reached" if that line was not executed.

Note: the RGB values of `hotpink` and `firebrick` are given on the second last page.

```
def mysterious(pic):
    x = 0

    y = 0

    for pix in pic:

        b = media.get_blue(pix)

        z = b < 150

        if z:

            x = x + 1

        else:

            y = y + 1
```

Show variable values after each line has executed:				
x:				
y:				
	During interation:			
	1	2	3	4
b:				
z:				
z:				
x:				
y:				

Question 3.   [8 marks]

Write a program that prompts for a picture file using `choose_file`. It then uses `raw_input` to prompt for a colour component (either "red", "green", or "blue"). This program consists of two parts: a function, `diff_colour`, on this page, and a main block on the next page.

For the colour component selected, for each pixel in the picture, your program should set that colour component to the absolute value of the difference of the other two colour components of that pixel. At the end of the program, show the resulting picture.

You may assume that the colour component entered is either "red", "green" or "blue".

Your program should define and use the function `diff_colour` according to its docstring description below.

```
import media

def diff_colour(pic, colour):
    '''Given a Picture pic and a string colour ("red", "green" or "blue"), for
    each pixel in pic, set that colour component to the absolute value of the
    difference of the other two colour components of that pixel.'''
```

(Continued on the next page)

More space for your answer to Question 3.

```
if __name__ == '__main__':
```

[Use the space below for rough work. This page will not be marked, unless you clearly indicate the part of your work that you want us to mark.]

Short Python function/method descriptions:

```
__builtins__:
  abs(number) -> number
    Return the absolute value of the given number.
  max(a, b, c, ...) -> value
    With two or more arguments, return the largest argument.
  min(a, b, c, ...) -> value
    With two or more arguments, return the smallest argument.
  raw_input([prompt]) -> string
    Read a string from standard input.  The trailing newline is stripped.  The prompt string,
    if given, is printed without a trailing newline before reading.
int:
  int(x) -> integer
    Convert a string or number to an integer, if possible.  A floating point argument
    will be truncated towards zero.
media:
  choose_file() --> str
    Prompt user to pick a file. Return the path to that file.
  create_picture(int, int) --> Picture
    Given a width and a height, return a Picture with that width and height.  All pixels are white.
  get_blue(Pixel) --> int
    Return the blue value of the given Pixel.
  get_color(Pixel) --> Color
    Return the Color object with the given Pixel's RGB values.
  get_green(Pixel) --> int
    Return the green value of the given Pixel.
  get_pixel(Picture, int, int) --> Pixel
    Given x and y coordinates, return the Pixel at (x, y) in the given Picture.
  get_red(Pixel) --> int
    Return the red value of the given Pixel.
  load_picture(str) --> Picture
    Return a Picture object from file with the given filename.
  set_blue(Pixel, int)
    Set the blue value of the given Pixel to the given int value.
  set_color(Pixel, Color)
    Set the RGB values of the given Pixel to those of the given Color.
  set_green(Pixel, int)
      Set the green value of the given Pixel to the given int value.
  set_red(Pixel, int)
    Set the red value of the given Pixel to the given int value.
  show(Picture)
    Display the given Picture.
  Color:
    black
      RGB: 0, 0, 0
    blue
      RGB: 0, 0, 255
    firebrick
      RGB: 178, 34, 34
    hotpink
      RGB: 255, 105, 180
    white
      RGB: 255, 255, 255
```

Last Name: _____   **First Name:** _____