1. [8 pts] What is the value computed by each of the following arithmetic expressions in the Python language?

\[ 20 \div 8 \]

\[ 20 \div (9 - 1.0) \]

\[ \text{(float)} (20 \div 8) \]

\[ 20 + 2 \times 4 \]

2. [7 pts ea.] For each of the following programs:
   a) Trace the program, including any changes in pixel color.
   b) Indicate the situation, if found, of code in which the body of a loop will never be executed, or code containing an infinite loop.

```python
# program a
game = Raster()
basket=7
court=1
while court < 7:
    game.set((court,basket), blue)
    basket = basket + 1
    court = court + 2
```

```python
# program c
game = Raster()
y=4
x=5
while (x < 10 and y < 8):
    game.set((y,x), orange)
    x = x + 1
    y = y + 2
```
# program d
game = Raster()
y=50
for x in range(50,55):
    game.set((x,y), green)
    game.set((x,y*2), white)

# program e
game = Raster()
y=7
for x in range(20,17, -1):
    game.set((x,y), blue)
    game.set((x,y+3), orange)

# program b
game = Raster()
y=4
x=3
while y < 10:
    game.set((x,y), blue)
    x = x + 2

# program f
game = Raster()
x = 2
y = 5
changeX = 1
changeY = 7 / 3
while (x < 5):
    game.set((x,y), orange)
    y = y + changeY
    x = x + changeX
# program g
game = Raster()
x=3
while (x < 6):
    y = 5
    while (y < 9):
        game.set((x,y), white)
        y = y + 2
    x = x + 1

# program h
game = Raster()
x=3
while (x <= 5):
    y = 5
    while (y < 9):
        game.set((x,y), orange)
        y = y + 1
    x = x + 1

# program i
game = Raster()
for x in range(20,25):
    for y in range(x, x+3):
        if y < 25:
            game.set((x,y), blue)
        elif x == 25:
            game.set((x,y), orange)
        else:
            game.set((x,y), white)
2. [10 pts] Define a function named `drawSq(img, color, a, b)` that draws a filled square of the specified color into Raster `img`, with the lower left corner positioned at coordinates (0,0). The value `a` indicates how many units large the square is in the horizontal direction, and the value `b` indicates how many units large the square is in the vertical direction.

3. [4 pts] Write the statement to invoke (call) the function `drawSq` to draw a green square **125 rows** high and **75 columns** wide in a Raster image named `spring`, which is defined as follows:

   ```
   spring = Raster()
   ```

4. [9 pts] Define a function named `compare(p, q, r)` that computes and returns a value based on the following rules:
   - if `p + q` is smaller than `r`, return `p * 2`
   - if `p + q` is larger than or equal to `r`, return `q + 3`

5. [6 pts] What would be reasonable test cases to test the function in question 4? Write the statements to call the `compare` function, passing a different set of your test values for `p, q, and r` each time. Select values that will cause each branch of your code to be executed at least once, and explain your reasons for selecting them.