Grade 6 Math Circles

Computer Science - Problem Set

1. Determine the values of each of the variables and their data types after the following code is run.

```
a = 17
b = 5.0
c = b - a
d = b * c
e = (a != d)
f = not(not(e))
g = e and not(f)
b = d
```

2. Let $a = 25$, $b = 4$ and $c = 9$. Determine the following.
   (a) $a + b - c$
   (b) a * (c / b)
   (c) (b ** b) + (9 // 4)
   (d) (a % b) − (a * b * c)

3. Let $a = 3$, $b = -8$, $c = 3.0$ and $d = 0$. Determine the following.
   (a) not(a == c)
   (b) (b <= c) and (d > b)
   (c) not((a != b) or (d == 0))

4. The volume of a rectangular prism is determined by multiplying the *length*, *width* and *height* of the rectangular prism by each other. Write a program called *rec_prism_volume* that inputs the length, width and height of a rectangular prism, and outputs the volume of the rectangular prism.

5. There are approximately 1.609344 kilometres in a mile. Write two programs:
   - *km_to_miles*, inputs a distance in kilometres and outputs the equivalent distance in miles
   - *miles_to_km*, inputs a distance in miles and outputs the equivalent distance in kilometres

Use these two programs to make the following conversions. Round to 4 decimal places.

(a) 1 km to miles

(b) 10 miles to km

(c) 120 km to miles

(d) 54.0592937 miles to km

Bonus Questions

6. Suppose a person writes code that prints the sum of any two inputted numbers. Their code is shown below, but it contains an error. Determine if it is a syntax error or a semantic error, and specify where it occurs. How could this code be fixed? (Hint: Run it through Python Tutor).

```
num1 = input('Enter a number:')
num2 = input('Enter another number:')

sum = num1 + num2

print('The sum of', num1, 'and', num2, 'is', sum)
```

7. The following code contains a total of 3 syntax errors. Identify each of them.

```
a == input("Enter a number:")
b = int(a)
c = a + b
a = int(a)
d = 0
e = a / d
```