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ASTE 404
Quiz 1
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Q1) An interpreted language is processed line by line, which means syntax errors will not be found until the program is actually run. A compiled language goes through an extra compiling step, during which a program makes sure the code is written correctly (no syntax errors or others that show up on compile time), and is run afterwards.

Q2) B, random number generator

Q3) True

Q4) A, a for loop

Q5)

```
import numpy as np

a = [0,1,2,3]
b = [2,3,4,5]
c = np.zeros(4)
for i in range (1,4):
c[i] = a[i] + b[i]
```

Q6) True value: -0.919
2^{nd} order approximation: -0.92
Percent error: 0.108%

(See work on attached page)

Q7) The matrix is singular since $2R_2 + R_1 = R_3$, so there is no solution.

(See next page for work and solution)

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Q6: $f(x) = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \cdots$

$f(0) = 0 - 0 + 0 - 1 = -1$

$f'(x) = 3x^2 + (-4x) + 1 \;;\quad f'(0) = 0 + 0 + 1 = 1$

$f''(x) = 6x - 4 \;;\quad f''(0) = 0 - 4 = -4$

$\Rightarrow f(0.1) \simeq -1 + 1(0.1) + \frac{-4}{2}(0.1 - 0)^2$

$f(0.1) \simeq -1 + 0.1 - 2(0.1^2)$

$\boxed{f(0.1) \simeq -0.92}$ $\qquad f(0.1) = -0.919$ (real value)

2nd order approximation is 0.108 % error

Q7:

$$\left.\begin{aligned} x_1 - 2x_3 &= 1 \\ x_0 + 2x_2 &= 2 \\ 2x_0 + x_1 + 4x_2 - 2x_3 &= 3 \\ x_0 - 2x_1 + x_3 &= 4 \end{aligned}\right\}$$

Let matrix be called A

$$A \xrightarrow{R_2 \to 2R_2 + R_1} \begin{bmatrix} 0 & 1 & 0 & -2 \\ 2 & 1 & 4 & -2 \\ 2 & 1 & 4 & -2 \\ 1 & -2 & 0 & 1 \end{bmatrix}$$

since two rows are linearly dependent, the matrix is singular.

Therefore there is no solution.