

$$1a. z_1 = 3j$$

$$z_2 = -3 + 4j$$

$$z_3 = 1 + 2j$$

$$j^2 = -1$$

$$\frac{z_3}{z_1 + z_2} = \frac{1 + 2j}{7j - 3} \times \frac{7j + 3}{7j + 3} = \frac{(1 + 2j)(7j + 3)}{(7j - 3)(7j + 3)}$$

$$= \frac{7j + 3 + 14j^2 + 3 + 6j}{49j^2 + 21j - 21j - 9} = \frac{7j + 3 + 14(-1) + 3 + 6j}{49(-1) + 21j - 21j - 9} = \frac{13j - 8}{-49 - 9}$$

$$= \frac{13j - 8}{-58}$$

1.

$$b. z_2^*$$

$$z_2 = -3 + 4j$$

$$z_2^* = -3 - 4j$$

$$\begin{aligned}
& 2. \quad \frac{x^4 - x^3 - 2x^2 + x + 7}{x^2 - x - 2} \\
& = \frac{-x^4 + x^3 + 2x^2 - x - 7}{-x^2 + x + 2} \\
& = x^2 + \frac{-x - 7}{-x^2 + x + 2} \\
& \frac{-x - 7}{-x^2 + x + 2} = - \frac{-x - 7}{(x-2)(x+1)} = \frac{x+7}{x^2 - x - 2} = \frac{x+7}{(x-2)(x+1)} \\
& = \frac{A}{(x+1)} + \frac{B}{(x-2)} \\
& \frac{x+7}{(x-2)(x+1)} = \frac{(x-2)A + (x+1)B}{(x-2)(x+1)} \\
& x+7 = (x-2)A + (x+1)B \\
& x+7 = xA + xB - 2A + B \\
& x+7 = x(A+B) - 2A + B \\
& \begin{aligned} A+B &= 1 \\ -2A+B &= 7 \end{aligned} \\
& \begin{aligned} 3A &= -6 \\ A &= -2 \\ B &= 3 \end{aligned} \\
& \boxed{= x^2 + \frac{-2}{x+1} + \frac{3}{x-2}}
\end{aligned}$$

3.

$$3a. \text{ test } (5, -3) \rightarrow x = 5, y = -3$$

$$x^2 - y^2 = 5^2 - (-3)^2 = 25 - 9 = \boxed{16}$$

$$b. \text{ test } (-4, 7, 10)$$

$$x = -4, y = 7, z = 10$$

$$2x + 3y + z = 2(-4) + 3(7) + 10 = \boxed{23}$$

$$c. \text{ test } (a)$$

$$x = a$$

$$3x + 2 = 3(a) + 2 = \boxed{2a}$$

4.

$$4a. \text{ cv} = \text{'Hellothere!'}$$

$$\boxed{= \text{ ' 1 x ' } }$$

b. str = "Hellothere!"

$\boxed{= |x|}$

c. $\boxed{\text{str} \{1\} (6)}$

5.

```
num1 = randi([2, 12]);  
num2 = randi([2, 12]);  
prompt = sprintf('%d * %d', num1, num2);  
userAns = input(prompt);
```

5.

6a. $\boxed{\text{client} = \text{struct};}$

6.

b. $\boxed{\text{client.first, client.last, client.birthdate}}$

7a. $[1 \times 1 \text{ string}]$

b. hello

c. i

d. $\text{cellmat} \{2, 1\} = [5:8];$

7.

8. The extension of a file is .mat.

9. 'Append to the file' means that values are added to an existing file. The entire file is rewritten and portions of the file can be overwritten. Meanwhile, 'write to the file' is typically used with a new and empty file.