

## Exam 2 – ACMAT117

Tuesday, November 11, 2025

This is a closed-book exam. You have 90 minutes

Calculators (non-graphing) are allowed ONLY to check your answers, but all answers should be **exact and simplified** unless stated otherwise.

**Justify your answers** to obtain full credit (and partial credit, too).

Please verify that you have all pages. If you need scratch paper, please ask.

You are welcome to use your own version of the reference page if you brought one. Otherwise, you will be given a standard blank version.

Name (first and last): \_\_\_\_\_

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**1.** (20 points) Complete the indicated operation, then simplify your answer, where  $i = \sqrt{-1}$

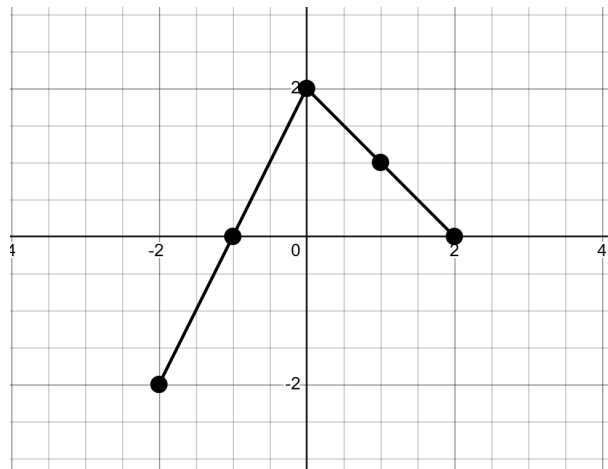
(a)  $(6 - 2i) - (7i - 1)$

(b)  $(3 + 4i)(2 + 5i)$

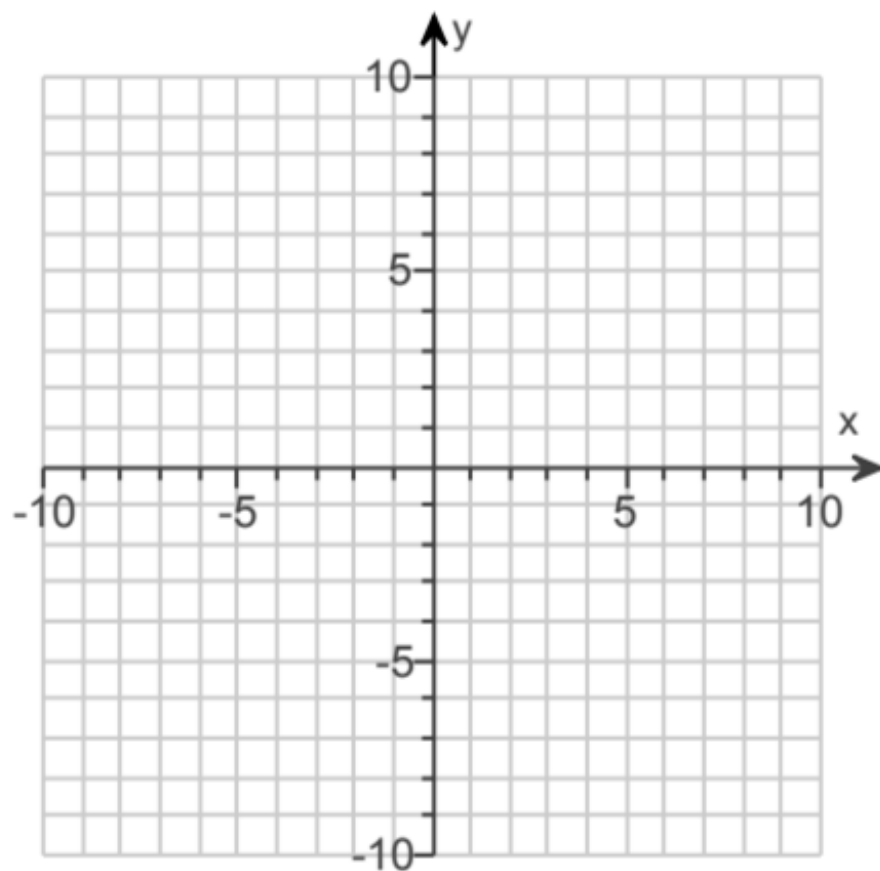
(c)  $(3 - i) \div (2 - 2i)$

(d)  $i^{31}$

2. (10 points) Consider the following graph of  $y = f(x)$



- (a) Write down the steps, in the correct order, of how you would draw  $y = -\frac{1}{2}f(x-1) - 3$
- (b) Graph the function from part (a), keeping track of the five indicated points.



**3.** (20 points) Solve the following:

(a)  $x^2 + 4x + 5 = 0$

(b)  $2x^2 - 9x - 5 < 0$  (Write your answer in interval notation)

(c)  $3(2x + 1)(x + 5)^2(x - 1) = 0$

(d)  $x^3 + 3x^2 - 4x - 12 = 0$

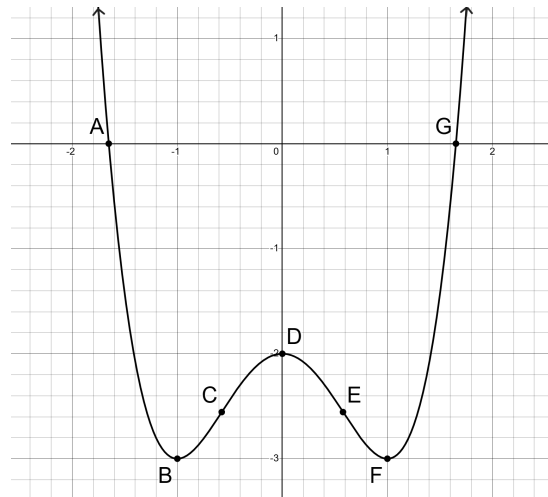
**4.** (*15 points*) Completely factor the following polynomials:

(a)  $5x^3 + 5x^2 - 30x$

(b)  $x^3 - 4x^2 - 7x + 10$

(c)  $x^3 + 3x^2 + 25x + 75$  given that  $x = 5i$  is a root.

5. (15 points) Consider the following polynomial graph:



Complete any 5 of the following. If you cannot tell what  $x$  or  $y$  value the point has, you may estimate or use the labeled letter.

- On what interval(s) is the function increasing?
- On what interval(s) is the function decreasing?
- Locate any absolute extrema and relative extrema.
- What are the zeros of the function? Determine if the multiplicity of each zero is odd or even.
- On what interval(s) is the function concave up?
- On what interval(s) is the function concave down?
- Locate any inflection point(s) of the function.
- Describe the end behavior of the graph.
- Does the polynomial have an even or odd degree? Is its leading coefficient positive or negative?

## Final Score

|            | Score | Out of |
|------------|-------|--------|
| Question 1 |       | 20     |
| Question 2 |       | 10     |
| Question 3 |       | 20     |
| Question 4 |       | 15     |
| Question 5 |       | 15     |
| Total      |       | 80     |