

I. Multiple Choice

_____ 1. Which of the following represents the quotient of

$$(x^5 - x^4 + 6x^3 - 2x^2 + x - 8) \div (x - 1) ?$$

A. $x^4 - 2x^3 + 4x^2 + 2x + 3 - \frac{5}{x-1}$

B. $x^4 + 6x^2 - 8x - 7 - \frac{15}{x-1}$

C. $x^4 + 6x^2 + 6x + 7 - \frac{1}{x-1}$

D. $x^4 + 6x^2 + 4x + 5 - \frac{3}{x-1}$

_____ 2. Which of the following could be used to perform the synthetic division for

$$(x^2 + 6x^4 - 7x^3 + 3) \div (x + 4)$$

A.
$$4 \left| \begin{array}{cccc} 1 & 6 & 7 & 3 \\ \hline \end{array} \right.$$

B.
$$-4 \left| \begin{array}{cccc} 1 & 6 & -7 & 3 \\ \hline \end{array} \right.$$

C.
$$-4 \left| \begin{array}{cccc} 6 & -7 & 1 & 0 & 3 \\ \hline \end{array} \right.$$

D.
$$4 \left| \begin{array}{cccc} 6 & -7 & 1 & 0 & 3 \\ \hline \end{array} \right.$$

_____ 3. Which is the remainder when $(x^6 + x^5 - 2x^4 + 2x^3 + 3x^2 - 4x + 6)$

is divided by $(x - 3)$?

A. 885

B. 876

C. 315

D. 1205

II. Long Division

Perform the following long division problems using ANY method:
SHOW ALL WORK.

4. $(2m^3 + 8m^2 - 7m + 12) \div (m + 2)$

5. $(8v^4 - 2v^2 + v + 4) \div (v - 1)$

6. $(2x^3 + x^2 - 8x + 9) \div (2x - 3)$

III. The first polynomial is a factor of the second polynomial.
Show **ALL** the linear factors of the second polynomial.

7. $2x + 1$; $4x^3 + 12x^2 - 19x - 12$

8. $x - 3$; $4x^3 - 8x^2 - 11x - 3$

IV. Write out all the *possible* rational solutions for each equation.

_____ 9. $2x^3 - 8x^2 + 4x + 3 = 0$

_____ 10. $x^4 - 2x^2 + 7 = 0$

V. Solve the following equations over the set of complex numbers:

11. Solve for x: $x^3 - 1 = 0$

12. Solve for x: $x^3 + 3x^2 - 4 = 0$

VI. Miscellaneous

13. Two of the solutions of $x^4 - 2x^3 + 3x^2 + 2x + 2 = 0$ are i and $-1+i$.
How many other solutions are there and what are they?

14. One solution of $x^3 + 4x^2 - 19x - 6 = 0$ is $\frac{-7 - \sqrt{41}}{2}$.
Find the other solutions.

Extra Credit:

Given the solutions of an equation are $x = 2$, $x = -1$, and $x = \frac{2}{3}$,
Determine the equation in standard form (with integral coefficients).