Problem 1 *Compute the following division:*

$$\left(-2\,x^4 - 5\,x^3 - 14\,x^2 - 9\,x - 8\right) \div \left(2\,x^2 + x + 2\right)$$
$$= \boxed{-x^2 - 2\,x - 5} + \frac{\boxed{2}}{\boxed{2\,x^2 + x + 2}}$$

Feedback(*`attempt`*): *When dividing, make sure to account for **all** powers of x, especially those missing in the polynomial. For example, if you are dividing x^3+3x-2, then first rewrite the polynomial as x^3+0x^2+3x-2 to ensure you are accounting for the missing x^2 term.*

When you are dividing by a polynomial that is higher than degree 1 (for example dividing by a quadratic like x^2-2) or if the leading term's coefficient is not 1 (for example, dividing by something like $3x+1$ or $-x+7$), it is much better to use polynomial long division, and not synthetic division. Synthetic division will almost certainly give you the wrong polynomial result in both these cases, without doing some clever extra steps.

Problem 2 *Compute the following division:*

$$\left(12\,x^6 - 5\,x^5 - 17\,x^4 + 2\,x^3 - 18\,x^2 - 10\,x + 4\right) \div (-4\,x - 5)$$
$$= \boxed{-3\,x^5 + 5\,x^4 - 2\,x^3 + 2\,x^2 + 2\,x} + \frac{\boxed{4}}{\boxed{-4\,x - 5}}$$

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Problem 3 *Compute the following division:*

$$\left(2\,x^7 - 7\,x^6 + 7\,x^5 - x^4 - 5\,x^3 - 4\,x^2 - 4\,x - 1\right) \div \left(x^2 - 2\,x - 1\right)$$
$$= \boxed{2\,x^5 - 3\,x^4 + 3\,x^3 + 2\,x^2 + 2\,x + 2} + \frac{\boxed{2\,x + 1}}{\boxed{x^2 - 2\,x - 1}}$$

Feedback(`attempt`): *When dividing, make sure to account for* ***all*** *powers of x, especially those missing in the polynomial. For example, if you are dividing x^3+3x-2, then first rewrite the polynomial as x^3+0x^2+3x-2 to ensure you are accounting for the missing x^2 term.*

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Problem 4 *Compute the following division:*

$$\left(10\,x^6+3\,x^5-13\,x^4-20\,x^3-3\,x^2+5\right)\div\left(-5\,x^2-4\,x-3\right)$$
$$=\boxed{-2\,x^4+x^3+3\,x^2+x-2}+\frac{\boxed{-5\,x-1}}{\boxed{-5\,x^2-4\,x-3}}$$

Feedback(`attempt`): *When dividing, make sure to account for* ***all*** *powers of x, especially those missing in the polynomial. For example, if you are dividing x^3+3x-2, then first rewrite the polynomial as x^3+0x^2+3x-2 to ensure you are accounting for the missing x^2 term.*

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