### Lesson 12 Practice Problems

1. The polynomial function $p\left(x\right)=x^{3}−3x^{2}−10x+24$ has a known factor of $\left(x−4\right)$.
	1. Rewrite $p\left(x\right)$ as the product of linear factors.
	2. Draw a rough sketch of the graph of the function.
2. Tyler thinks he knows one of the linear factors of $P\left(x\right)=x^{3}−9x^{2}+23x−15$. After finding that $P\left(1\right)=0$, he suspects that $x−1$ is a factor of $P\left(x\right)$. Here is the diagram he made to check if he’s right, but he set it up incorrectly. What went wrong?
*

| *
 | * $x^{2}$
 | * $-8x$
 | * -15
 |
| --- | --- | --- | --- |
| * $x$
 | * $x^{3}$
 | * $-8x^{2}$
 | * $-15x$
 |
| * 1
 | * $x^{2}$
 | * $-8x$
 | * -15
 |

1. The polynomial function $q\left(x\right)=2x^{4}−9x^{3}−12x^{2}+29x+30$ has known factors $\left(x−2\right)$ and $\left(x+1\right)$. Which expression represents $q\left(x\right)$ as the product of linear factors?
	1. $\left(2x−5\right)\left(x+3\right)\left(x−2\right)\left(x+1\right)$
	2. $\left(2x+3\right)\left(x−5\right)\left(x−2\right)\left(x+1\right)$
	3. $\left(2x+15\right)\left(x−1\right)\left(x−2\right)\left(x+1\right)$
	4. $\left(2x−15\right)\left(x+1\right)\left(x−2\right)\left(x+1\right)$
2. Each year a certain amount of money is deposited in an account which pays an annual interest rate of $r$ so that at the end of each year the balance in the account is multiplied by a growth factor of $x=1+r$. $1,000 is deposited at the start of the first year, an additional $300 is deposited at the start of the next year, and $500 at the start of the following year.
	1. Write an expression for the value of the account at the end of three years in terms of the growth factor $x$.
	2. Determine (to the nearest cent) the amount in the account at the end of three years if the interest rate is 4%.
* (From Unit 2, Lesson 2.)
1. State the degree and end behavior of $f\left(x\right)=5+7x−9x^{2}+4x^{3}$. Explain or show your reasoning.
* (From Unit 2, Lesson 8.)
1. Describe the end behavior of $f\left(x\right)=1+7x+9x^{3}+6x^{4}−2x^{5}$.
* (From Unit 2, Lesson 10.)
1. What are the points of intersection between the graphs of the functions $f\left(x\right)=\left(x+3\right)\left(x−1\right)$ and $g\left(x\right)=\left(x+1\right)\left(x−3\right)$?
* (From Unit 2, Lesson 11.)



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