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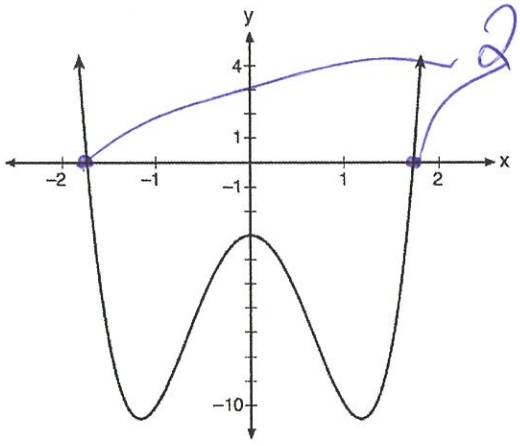
Date _____
Algebra II

Sketching Polynomial Graphs Regents Practice

1. Consider the function $p(x) = 3x^3 + x^2 - 5x$ and the graph of $y = m(x)$ below.



2 real zeros

Which statement is true?

1) $p(x)$ has three real roots and $m(x)$ has two real roots.
2) $p(x)$ has one real root and $m(x)$ has two real roots.
3) $p(x)$ has two real roots and $m(x)$ has three real roots.
4) $p(x)$ has three real roots and $m(x)$ has four real roots.

2. Consider the end behavior description below.

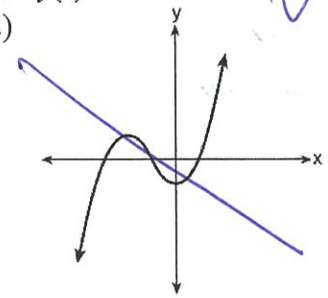
left UP

- as $x \to -\infty, f(x) \to \infty$
- as $x \to \infty, f(x) \to -\infty$

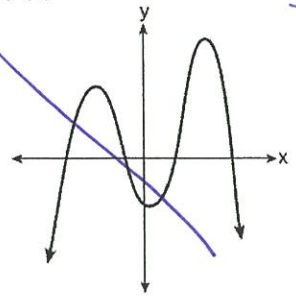
right DOWN

Which function satisfies the given conditions?

1) $f(x) = x^4 + 2x^2 + 1$
2)



3) $f(x) = -x^3 + 2x - 6$
4)

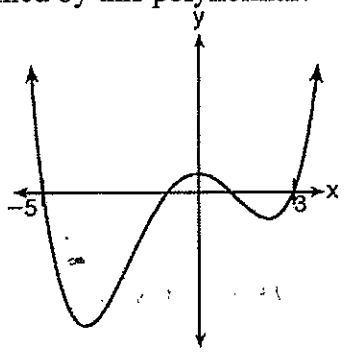


only 2 real zeros

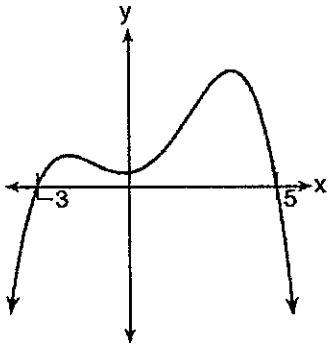
3. A 4th degree polynomial has zeros -5, 3, i, and $-i$. Which graph could represent the function defined by this polynomial?

not real

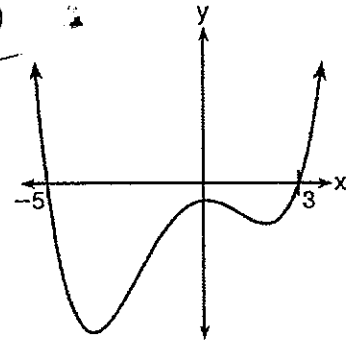
1)



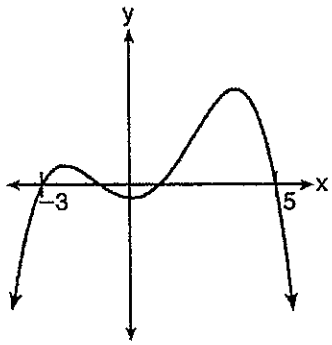
3)



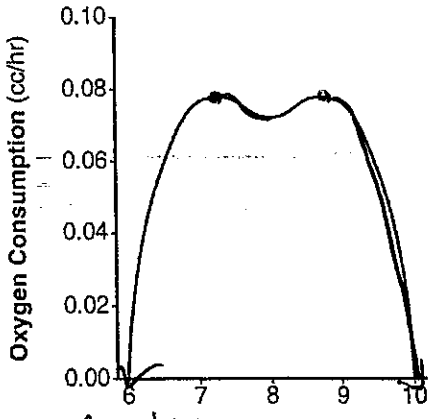
2)



4)



4. There was a study done on oxygen consumption of snails as a function of pH, and the result was a degree 4 polynomial function whose graph is shown below.



Which statement about this function is *incorrect*?

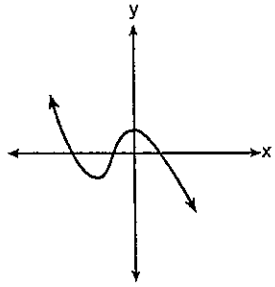
1) The degree of the polynomial is even. ✓
2) There is a positive leading coefficient. ✗
3) At two pH values, there is a relative maximum value. ✓
4) There are two intervals where the function is decreasing. ✓

negative leading coefficient

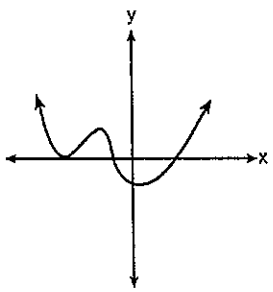
5. Which graph has the following characteristics?

- three real zeros
- as $x \to -\infty$, $f(x) \to \infty$ (left, down)
- as $x \to \infty$, $f(x) \to \infty$ (right, up)

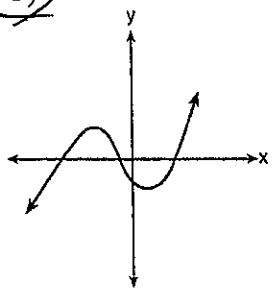
1)



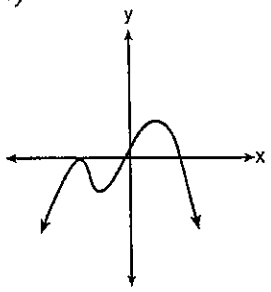
2)



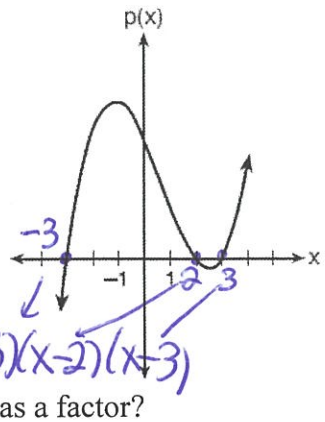
3)



4)



6. The graph of the function $p(x)$ is sketched below.



$(x+3)(x-2)(x-3)$

Which equation could represent $p(x)$?

1) $p(x) = (x^2 - 9)(x - 2)$ $(x+3)(x-3)(x-2)$

2) $p(x) = x^3 - 2x^2 + 9x + 18$

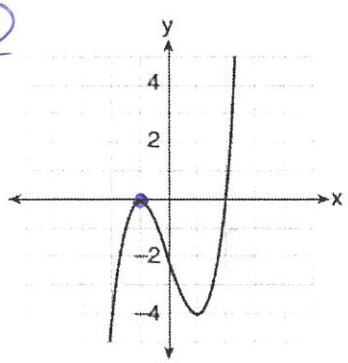
3) $p(x) = (x^2 + 9)(x - 2)$

4) $p(x) = x^3 + 2x^2 - 9x - 18$

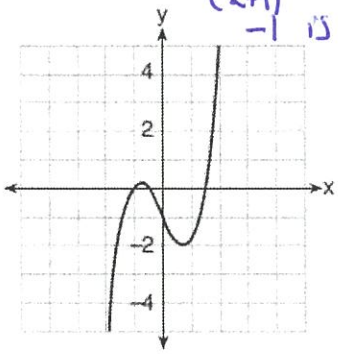
7. Which graph represents a polynomial function that contains $x^2 + 2x + 1$ as a factor?

$(x+1)^2$ -1 is a double root

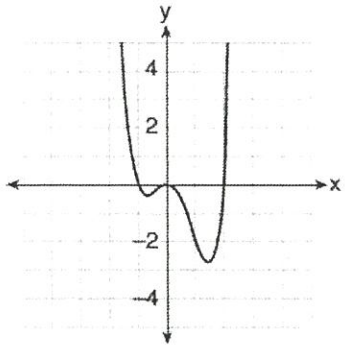
1)



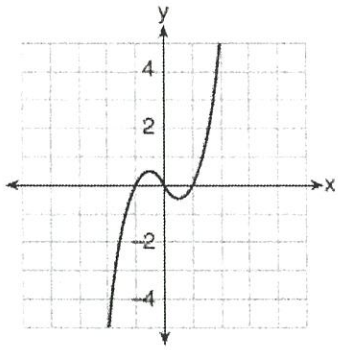
3)



2)



4)

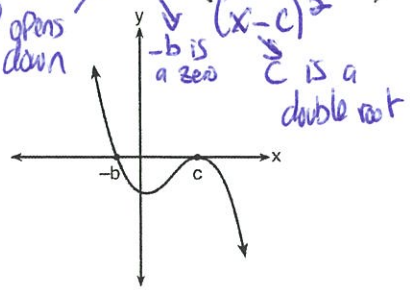


8. If a, b, and c are all positive real numbers, which graph could represent the sketch of the graph of $p(x) = -a(x + b)\left(x^2 - 2cx + c^2\right)$?

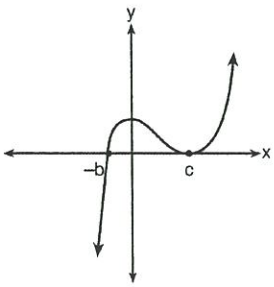
1) opens down

$-b$ is a zero

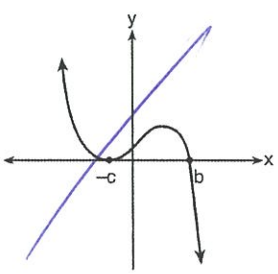
$(x-c)^2$ c is a double root



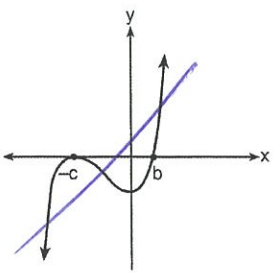
3)



2)



4)



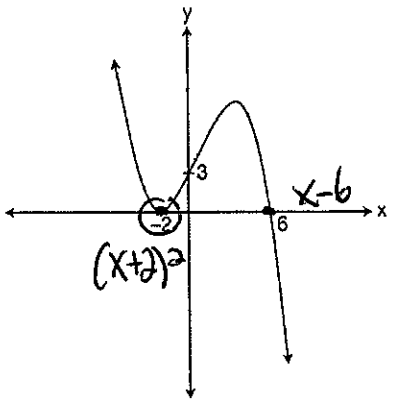
4(3) → maximum of 3 zeros
positive odd

9. Which description could represent the graph of $f(x) = (4x^2(x+a)(-x-a)$ if a is an integer?

1) As $x \to -\infty, f(x) \to \infty$, as $x \to \infty, f(x) \to \infty$, and the graph has 3 x-intercepts.
2) As $x \to -\infty, f(x) \to -\infty$, as $x \to \infty, f(x) \to \infty$, and the graph has 3 x-intercepts.
3) As $x \to -\infty, f(x) \to \infty$, as $x \to \infty, f(x) \to -\infty$, and the graph has 4 x-intercepts.
4) As $x \to -\infty, f(x) \to -\infty$, as $x \to \infty, f(x) \to \infty$, and the graph has 4 x-intercepts.

$4x^2(x+a) - 1(x+a)$
$(4x^2 - 1)(x+a)$

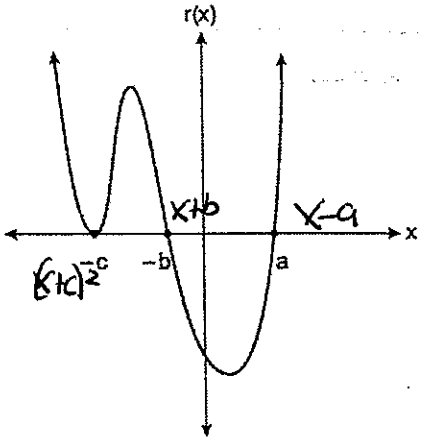
10. The graph below shows the polynomial $y = p(x)$.



The factors of $p(x)$ are

(1) $(x+2)$, $(x-3)$, and $(x+6)$
(2) $(x-2)$, $(x+3)$, and $(x+6)$
(3) $(x-2)$, $(x-2)$, and $(x+6)$
(4) $(x+2)$, $(x+2)$, and $(x-6)$

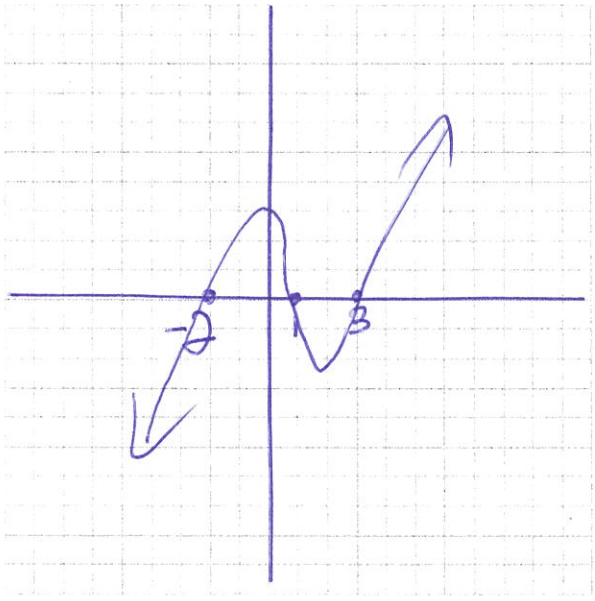
11. A sketch of $r(x)$ is shown below.



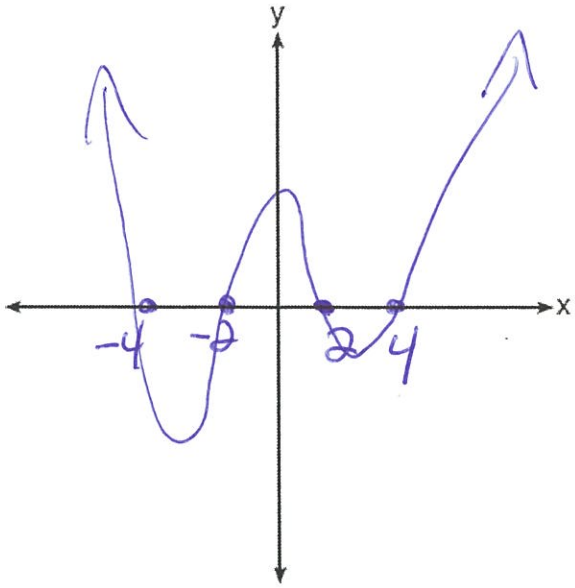
An equation for $r(x)$ could be

1) $r(x) = (x-a)(x+b)(x+c)$
2) $r(x) = (x+a)(x-b)(x-c)^2$
3) $r(x) = (x+a)(x-b)(x-c)$
4) $r(x) = (x-a)(x+b)(x+c)^2$

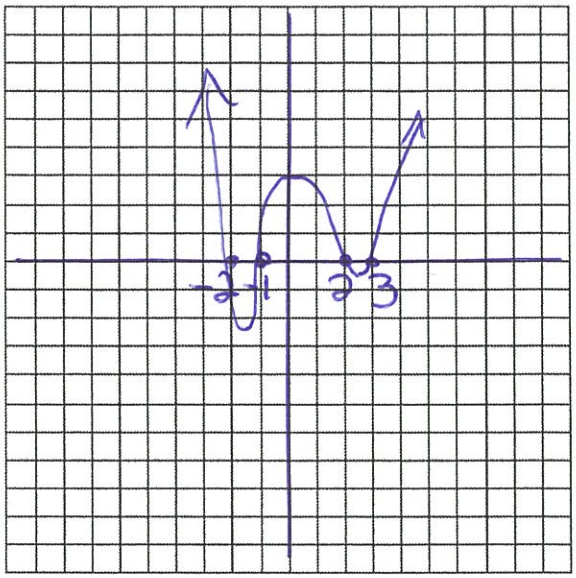
12. On the grid below, sketch a cubic polynomial whose zeros are 1, 3, and -2.



13. The zeros of a quartic polynomial function are 2, −2, 4, and −4. Use the zeros to construct a possible sketch of the function, on the set of axes below.



14. The zeros of a quartic polynomial function h are $-1, \pm 2$, and 3. Sketch a graph of $y = h(x)$ on the grid below.



a b -c

15. On the axes below, sketch a possible function $p(x) = (x-a)(x-b)(x+c)$, where a, b, and c are positive, $a > b$, and $p(x)$ has a positive y-intercept of d. Label all intercepts.