Name Schlansky Date

Algebra II CC – Midterm Review HW #1 Period

1. For which function does $f(x) \to -\infty$ as $x \to \infty$ and $f(x) \to \infty$ as $x \to -\infty$?

down right UP left

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

(2) $f(x) = -4x^3 + 7x^2 - x + 1$

(3) $f(x) = 2x^4 - 2x^3 + x - 5$

(4) $f(x) = -x^4 + x^2 - 5x + 3$

odd, −

2. The zeroes of the function $x^4 - 13x^2 + 36 = 0$ are

mc strategy

$x^4-13x^2+36=0$

$(x^2-9)(x^2-4)=0$

$(x+3)(x-3)(x+2)(x-2)=0$

$x+3=0$ $x-3=0$ $x+2=0$ $x-2=0$

$x=-3$ $x=3$ $x=-2$ $x=2$

(1) $\{2, 3\}$

(2) $\{-2, -3\}$

(3) $\{\pm 2, \pm 3\}$

(4) $\{\pm 2i, \pm 3i\}$

3. The expression $\dfrac{x^2 + 5x - 20}{x - 3}$ is equivalent to

mc strategy

$x+8+\frac{4}{x-3}$

$x-3\overline{)x^2+5x-20}$

$-x^2+3x$

$8x-20$

$-8x+24$

4

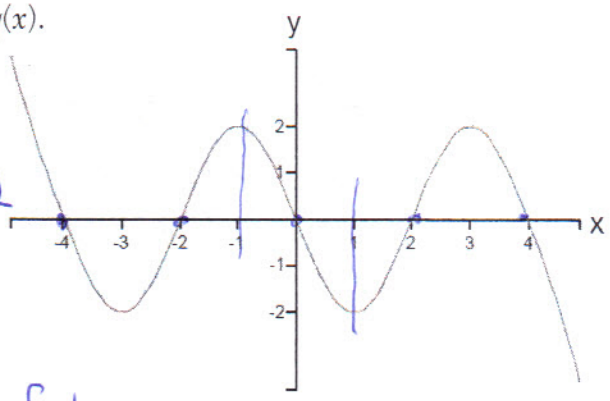
(1) $x + 8 + \dfrac{4}{x-3}$

(2) $x + 8 - \dfrac{4}{x-3}$

(3) $x + 8$

(4) $x - 8 + \dfrac{4}{x-3}$

4. The graph to the right shows a polynomial function $y = q(x)$.



Which statement is true?

(1) The leading coefficient of q is positive. ✗

(2) The remainder when $q(x) \div (x - 3)$ is negative. $q(3)=2$ ✗

(3) The graph of q is decreasing for $-1 < x < 1$. ✓

(4) q is a fourth-degree polynomial. 5 zeros ✗

$x+4$ is a factor

5. For a polynomial function $g(x)$, it is known that $g(-4) = 0$. Which statement is true?

(1) The remainder when g is divided by $x - 4$ is zero. $x+4$ ✗

(2) The binomial $x - 4$ is a factor of g. $x+4$ ✗

(3) A zero of the graph of g is -4. ✓

(4) The graph of g has an x-intercept at $x = 4$. -4 ✗

6. Which factorization is *incorrect*?

(1) $3w^2 - 19w + 6 = (3w - 1)(w - 6)$

(2) $h^3 + 8 = (h + 2)(h^2 - 2h + 4)$

(3) $c^2 - 12c + 36 = (c + 6)(c - 6)$

(4) $81 - 121y^2 = (9 - 7y)(9 + 7y)$

MC Strategy

$3w^2 - 19w + 6$

$w^2 - 19w + 18$

$(w - \frac{18}{3})(w - \frac{1}{3})$

$(w - 6)(3w - 1)$ ✓

$a = h \quad b = 2$

$h^3 + 8$

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$h^3 + 8 = (h + 2)(h^2 - 2h + 4)$ ✓

$c^2 - 12c + 36$

$(c - 6)(c - 6)$

$81 - 121y^2 = (9 + 11y)(9 - 11y)$

7. Determine the value of k for the polynomial $p(x) = 2x^3 + 3x^2 + kx - 30$ if p has a factor of $x + 2$.

$0 = 2(-2)^3 + 3(-2)^2 + k(-2) - 30$

$0 = -16 + 12 - 2k - 30$

$0 = -2k - 34$

$+34 \quad +34$

$\frac{34}{-2} = \frac{-2k}{-2} \quad k = -17$

-2 is a zero

$(-2, 0)$

Determine all of the zeroes of $p(x)$.

$$x + 2 \overline{)\, 2x^3 + 3x^2 - 17x - 30}$$

$2x^2 - x - 15$

$-2x^3 + 4x^2$

$-1x^2 - 17x$

$+1x^2 + 2x$

$-15x - 30$

$+15x + 30$

0

$(x + 2)(2x^2 - x - 15) = 0$

$(x + 2)(x^2 - x - 30) = 0$

$(x + 2)(x - 6)(x + 5) = 0$

$\frac{}{2} \quad \frac{}{2}$

$(x + 2)(x - 3)(2x + 5) = 0$

$x + 2 = 0 \quad x - 3 = 0 \quad 2x + 5 = 0$

$-2 \quad -2 \quad +3 \quad +3 \quad -5 \quad -5$

$\frac{2x}{2} = \frac{-5}{2}$

$x = -2 \quad x = 3 \quad x = -\frac{5}{2}$

square binomial theorem

8. Prove that $(a + b^2)^2 - (a - b^2)^2 = 4ab^2$ for all real numbers a and b.

distribute the negative

$(a^2 + 2ab^2 + b^4) - (a^2 - 2ab^2 + b^4) = 4ab^2$

$a^2 + 2ab^2 + b^4 - a^2 + 2ab^2 - b^4 = 4ab^2$

$4ab^2 = 4ab^2$

9. Factor completely: $x^3 - 8x^2 + 15x - 2x^2 + 16x - 30$

$\frac{x^3}{x} \quad \frac{-8x^2}{x} \quad \frac{15x}{x} \quad \frac{-2x^2}{-2} \quad \frac{16x}{-2} \quad \frac{-30}{-2}$

$x(x^2 - 8x + 15) - 2(x^2 - 8x + 15)$

$(x - 2)(x^2 - 8x + 15)$

$(x - 2)(x - 5)(x - 3)$