Algebra 2/Trig
Chapter 6 Review

1) Write a polynomial function of least degree with integral coefficients that has the given zeros. $-3, 2i$

$(x+3)(x-2i)(x+2i)$
$(x+3)(x^2-4i^2)$
$(x+3)(x^2+4)$
$\boxed{f(x) = x^3+3x^2+4x+12}$

2) Write a cubic function whose graph passes through the given points.
$(2,0),(4,0),(-3,0),(3,12)$

$12 = a(3-2)(3-4)(3+3)$
$12 = a(1)(-1)(6)$
$12 = -6a$
$-2 = a$

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

**Divide using long division**

3) $(4n^4 + 14n^3 + 4n^2 - 29n - 30) \div (2n + 5)$

$2n^3+2n^2-3n-7+\frac{5}{2n+5}$

4. $(16b^4 - 25b^3 + b - 2) \div (b^2 - 1)$

$16b^2-25b+16+\frac{-24b+14}{b^2-1}$

**Divide using synthetic division**

5) $(7x^3 + 17x^2 + x - 14) \div (x + 1)$

$7x^2+10x-9-\frac{5}{x+1}$

6) $(3n^3 + 30n^2 + 70n - 45) \div (n + 7)$

$3n^2+9n+7-\frac{4}{n+7}$

Find all zeros.

7.) $f(x) = x^3 - x^2 - 7x + 15$

$\boxed{-3, 2\pm i}$

$x^2-4x+5=0$

$\frac{-(-4)\pm\sqrt{(-4)^2-4(1)(5)}}{2(1)} = \frac{4\pm\sqrt{16-20}}{2} = \frac{4\pm\sqrt{-4}}{2} = \frac{4\pm 2i}{2} = 2\pm 1i$

8.) $f(x) = x^3 + 2x^2 - x - 2$

$x^2+3x+2$
$(x+1)(x+2)$
$-1 \quad -2$

$\boxed{1,-1,-2}$

State all the possible rational zeros.

9.) $f(x) = 5x^4 - 36x^2 - 81$

1, 5    1, 3, 9, 27, 81

$\pm1, \pm3, \pm9, \pm27, \pm81, \pm\frac{1}{5}, \pm\frac{3}{5}, \pm\frac{9}{5}, \pm\frac{27}{5}, \pm\frac{81}{5}$

**Simplify. Your answer should contain only positive exponents.**

10) $x^{-4}y^{4}\cdot x^{2}y^{-3}$ $\quad x^{-2}y^{1}$ $\quad \boxed{\dfrac{y}{x^2}}$

11) $m^{4}n^{4}\cdot m^{-4}n^{2}$ $\quad \cancel{m^0}n^6$ $\quad \boxed{n^6}$

12) $(2x^{-2}y^{-1})^{4}$ $\quad 2^4x^{-8}y^{-4}$ $\quad \boxed{\dfrac{16}{x^8y^4}}$

13) $(2x^{-2}y^{3})^{-1}$ $\quad 2^{-1}x^{2}y^{-3}$ $\quad \boxed{\dfrac{x^2}{2y^3}}$

14) $\dfrac{4u^{4}}{u^{2}v^{-3}}$ $\quad \boxed{4u^2v^3}$

15) $\dfrac{2x^{4}}{x^{4}y^{-3}}$ $\quad \boxed{2y^3}$

**Solve**

$-1, 1,$

16) $x^6 - 1 = 0$

$(x^3+1)(x^3-1)$

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

$\dfrac{1\pm\sqrt{(-1)^2-4(1)(1)}}{2(1)} = \dfrac{1\pm i\sqrt{3}}{2}$ $\quad \dfrac{-1\pm\sqrt{(1)^2-4(1)(1)}}{2(1)} = \dfrac{-1\pm i\sqrt{3}}{2}$

17) $x^6 + 3x^4 - x^2 - 3 = 0$

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

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

$(x^2+3)(x^2+1)(x^2-1)$

$\pm i\sqrt{3}\quad \pm i\quad \pm 1$

**Factor each completely.**

18) $125 - 8x^3$

$(5-2x)(25+10x+4x^2)$

19) $27u^3 + 64$

$(3u+4)(9u^2-12u+16)$

Graph the function. Complete the table. Identify and label the local maximums and the zeros.

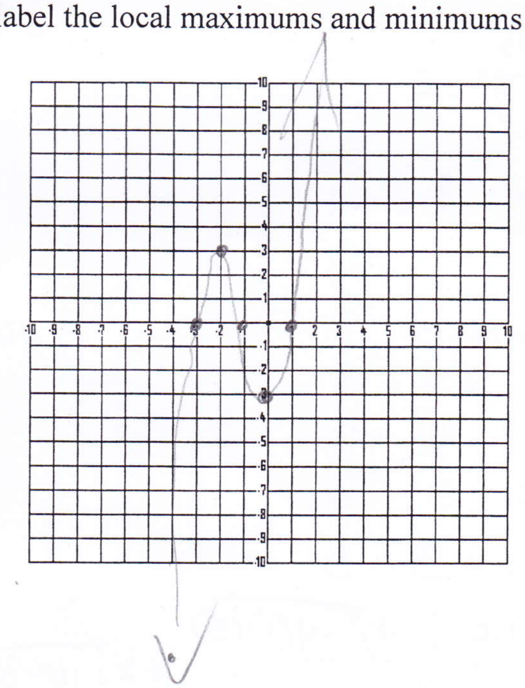
20. $f(x) = (x-1)(x+1)(x+3)$

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -4 | -3 | -2 | -1 | 0 | 1 | 2 | | |
| -15 | 0 | 3 | 0 | -3 | 0 | 15 | | |

Local max $(-2, 3)$

Local min $(0, -3)$

Zeros $-3, -1, 1$



| x | y |
|---|---|
| -4 | $(-5)(-3)(-1) = -15$ |
| -2 | $(-3)(-1)(1) = 3$ |
| 0 | $(-1)(1)(3) = -3$ |
| 2 | $(1)(3)(5) = 15$ |

Describe the end behavior of each function.

21. $f(x) = -x^5 + 6x^4 - 5x^2 + 9$

as $x \to +\infty$, then $y \to -\infty$

as $x \to -\infty$, then $y \to +\infty$

22. $f(x) = 5x^4 - x^3 + 9x - 2$

as $x \to +\infty$, then $y \to +\infty$

as $x \to -\infty$, then $y \to +\infty$