Find the following in problems 1 – 4:
- a) The number of complex roots.
- b) List the possible rational roots
- c) Determine the **rational** roots

1) $6x^3 + 11x^2 - 3x - 2 = 0$

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

3) $2x^3 + 3x^2 - 8x + 3 = 0$

4) $2x^4 + 3x^3 - 6x^2 - 11x - 3 = 0$

Use the remainder theorem to find the remainder for each division. State whether the binomial is a factor of the polynomial:

5) $(x^3 - x + 6) \div (x - 2)$

6) $(2x^3 - 3x^2 + x) \div (x - 1)$

Determine the binomial factors of each polynomial: Syn. Div (-1)

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

8) $x^3 + 3x^2 + 3x + 1$

Find all the roots of:

9) $x^3 + 8x^2 + 16x + 5 = 0$

Answer key column:

1a) 3

b) $\pm 1, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{1}{6}, \pm 2, \pm \frac{2}{3}$

c) $-2, -\frac{1}{3}, \frac{1}{2}$

2a) 3

b) $\pm 1, \pm 2$

c) 1

3a) 3

b) $\pm 1, \pm \frac{1}{2}, \pm 3, \pm \frac{3}{2}$

c) $1, -3, \frac{1}{2}$

4a) 4

b) $\pm 1, \pm 3, \pm \frac{1}{2}, \pm \frac{3}{2}$

c) $-\frac{3}{2}$

5) 12 | No

6) 0 | Yes.

7) $(x+1)(x-1)(x+4)$

8) $(x+1)^3$

9) $x = -5, \dfrac{-3 \pm \sqrt{5}}{2}$

Solve each inequality:

$\boxed{\frac{LCD}{w}}$ 10) $\frac{2}{w} + 3 > \frac{29}{w}$

$2 + 3w > \frac{29}{2}$

$3w > \frac{27}{3}$

$\boxed{w > 9}$ (9.00)

$(-\infty, 0)$

$\frac{-1}{1 - 29}$ O $\frac{2}{3} > 29$ 9 10

$3.2 > 2.9$

11) $\frac{(x-3)(x-4)}{(x-5)(x-6)^2} \leq 0$

$(-\infty, 3]$ $[4,5]$

$3 \equiv 4 + 5 + 6 \pm$

$\oplus \leq 0$ $\ominus \leq 0$ $\oplus \leq 0$ $\oplus \leq 0$

Restr: $x \neq$

10) $(-\infty, 0) \cup (9, \infty)$

11) $(-\infty, 3] \cup [4, 5]$

$\boxed{\frac{LCD}{8a}}$ 12) $\frac{1}{4a} + \frac{5}{8a} > \frac{1}{2}$

Restr $\boxed{a \neq 0}$

$2 + 5 > 4a$

$7 > 4a$

$\boxed{a < \frac{7}{4}}$

$\left(0, \frac{7}{4}\right)$

$\frac{-7}{8} \frac{1}{2}$ O $\frac{7}{8} > \frac{1}{2}$ 1.75 $\frac{7}{16} > \frac{1}{2}$

12) $\left(0, \frac{7}{4}\right)$

Perform the indicated operation. Simplify all answers.

13) $\frac{14be}{3a^4} \cdot \frac{7a}{28c^4} = \boxed{\frac{14}{3ac}}$
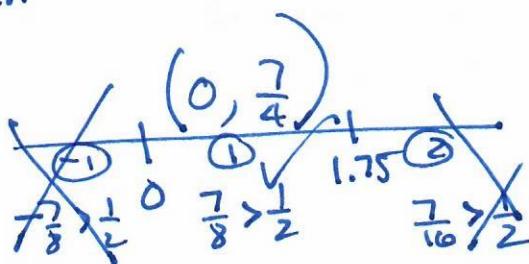
14) $\frac{9}{5y} - \frac{1}{6y}$

$\frac{54 - 5}{30y} = \boxed{\frac{49}{30y}}$

13) $\frac{14}{3ac}$

$\boxed{a, b, c \neq 0}$

14) $\frac{49}{30y}$

$\boxed{y \neq 0}$

15) $\frac{x^2 + 7x}{x^2 - 49} \cdot \frac{x^2 + 4x - 21}{x^2 - 3x}$

$\frac{x(x+7)}{(x+7)(x-7)} \cdot \frac{(x+7)(x-3)}{x(x-3)} = \boxed{\frac{x+7}{x-7}}$

15) $\frac{x+7}{x-7}$

$x = 0, \ x \neq \pm 7, \ x \neq 3$