College Transition Math
Review Section 2E & 2F

Name Key

Use the table of values and the location principle to find what two consecutive $x$-integers a real root must fall between

1)

| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| f(x) | 11 | 2 | -1 | -8 | -17 | -2 | 1 | 7 | -2 |

x-integers (values): -3 & -2, 1 & 2, 3 & 4

Determine which method is appropriate to use to solve the following equations. **DO NOT** actually **SOLVE** them! Fill in the blank with "G" for grouping, "C" for GCF, "P" for perfect cube factoring (little parenthesis/big parenthesis), "Q" for quadratic substitution or "R" for the rational root theorem (p's & q's).

2) Q $x^6 + 9x^3 + 20 = 0$

3) C $3x^3 - 12x^2 - 15x = 0$

4) G $2x^3 - 8x^2 + 5x - 20 = 0$

4) R $x^5 + x^4 - 7x^2 + 4x = 10$

5) C $x^5 - 9x^3 = 0$

6) G $x^4 + 8x^3 + 8 + x = 0$

7) P $x^3 = 27$

8) Q $2x^4 - 9x^2 - 5 = 0$

Solve the following equations by grouping.

9) $3x^3 + 2x^2 - 27x - 18 = 0$

$3x(x^2-9) + 2(x^2-9) = 0$

$(3x+2)(x^2-9) = 0$

$x = -2/3 \quad x = \pm 3$

10) $4x^3 + x - 32x^2 = 8$

$4x^3 - 32x^2 + x - 8 = 0$

$4x^2(x-8) + 1(x-8) = 0$

$(4x^2+1)(x-8) = 0$

$x = \pm .5i \quad x = 8$

Change each equation into a quadratic (***quadratic substitution***), then solve. Be sure to find ***all*** the roots. Round to nearest tenths if necessary.

11) $x^4 - 12x^2 + 20 = 0$

$b^2 - 12b + 20 = 0$

$(b-10)(b-2) = 0$

$b = 10 \quad b = 2$

$x^2 = 10 \quad x^2 = 2$

$x = \pm\sqrt{10} \quad x = \pm\sqrt{2}$

12) $3x^4 + x^2 - 8 = 0$

$3y^2 + y - 8 = 0$

$y = 1.5 \quad y = -1.8$

$x^2 = 1.5 \quad x^2 = -1.8$

$x = \pm 1.2 \quad x = \pm 1.3i$

For the following polynomial functions, list all their possible rational roots. **DO NOT SOLVE**, just list!

13) $f(x) = x^6 - 5x^3 + 2x^2 + 24$

p: $\pm 1, 2, 3, 4, 6, 8, 12, 24$

q: $\pm 1$

p/q: $\pm 1, 2, 3, 4, 6, 8, 12, 24$

14) $g(x) = 3x^3 + x - 8$

p: $\pm 1, 2, 4$

q: $\pm 1, 3$

p/q: $\pm 1, 2, 4, 1/3, 2/3, 4/3$

15) $y = 14x^4 + 13x^3 + 12x^2 + 1$

p: $\pm 1$

q: $\pm 1, 2, 7, 14$

p/q: $\pm 1, 1/2, 1/7, 1/14$

16) $h(x) = 4x^5 - 10x^4 - 9x^3 + 2x^2 + x - 4$

p: $\pm 1, 2, 4$

q: $\pm 1, 2, 4$

p/q: $\pm 1, 2, 4, 1/2, 1/4$

Solve each equation using the rational root theorem (p's & q's).

17) $x^4 + 6x^3 + 10x^2 + 6x + 9 = 0$

$$\begin{array}{c|ccccc} \boxed{-3} & 1 & 6 & 10 & 6 & 9 \\ & & -3 & -9 & -3 & -9 \\ \hline & 1 & 3 & 1 & 3 & 0 \end{array}$$

$x^3 + 3x^2 + x + 3 = 0$

$x^2(x+3) + 1(x+3) = 0$

$(x^2+1)(x+3) = 0$

$x = -3, \; x = \pm i, \; x = -3$

18) $8x^4 + 2x^3 - 35x^2 - 8x + 12 = 0$

$$\begin{array}{c|ccccc} \boxed{2} & 8 & 2 & -35 & -8 & 12 \\ & & 16 & 36 & 2 & -12 \\ \hline \boxed{-2} & 8 & 18 & 1 & -6 & 0 \\ & & -16 & -4 & 6 & \\ \hline & 8 & 2 & -3 & 0 & \end{array}$$

$\underbrace{8 \quad 2 \quad -3}_{\text{program}}$

or

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

$(4x+3)(2x-1) = 0$

$x = \pm 2, \; x = -3/4, \; x = 1/2$