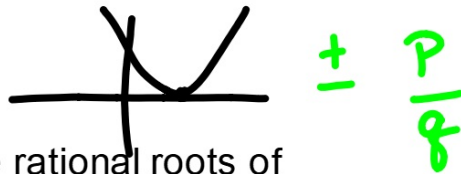


Trig 4.4



Identify possible rational roots of polynomial equations

Determine the number of positive and negative real roots

Quiz 4.3-4.4 Wed.

⊕ sign changes -2 -2...
⊖ f(x) " " " -2...

rational root theorem: if any are rational (but they could also be irrational, complex)

DeCarte's rule of signs: find REAL (but not complex)

positive real roots

negative real roots

complication: zero or double roots

Double root

whiteboards

MID-CHAPTER QUIZ

7. Determine the binomial factors of $x^3 - 2x^2 - 5x + 6$. (Lesson 4-3)

$$\begin{array}{r}
 1 \mid 1 \quad -2 \quad -5 \quad 6 \\
 \downarrow \quad 1 \quad -1 \quad -6 \quad 1) \text{ list } \quad \pm \quad \underline{1, 2, 3, 6} \\
 1 \quad -1 \quad -6 \quad 0 \quad 2) \text{ pos: } 2, 6 \\
 \end{array}$$

neg: 1

$$\begin{array}{l}
 x^2 - x - 6 \\
 \begin{array}{r}
 -6 \\
 -3 \quad 2 \\
 \hline
 -1
 \end{array}
 \end{array}$$

$(x-3)(x+2)$
 $x = +3 \quad x = -2$

$$\begin{array}{l}
 x = 1 \\
 x = 2 \\
 x = -2
 \end{array}$$

$$\pm \frac{1, 3}{1}$$

$$\begin{array}{r|rrrr} -3 & 1 & 6 & 10 & 3 \\ & \downarrow & -3 & -9 & -3 \\ \hline & 1 & 3 & 1 & 0 \end{array}$$

$$x^2 + 3x + 1$$

$$x = \frac{-3 \pm \sqrt{9-4}}{2}$$

$$x = \frac{-3 \pm \sqrt{5}}{2}$$

(pos) —

(neg) 3, 1

8. List the possible rational roots of $x^3 + 6x^2 + 10x + 3 = 0$. Then determine the rational roots. (Lesson 4-4)

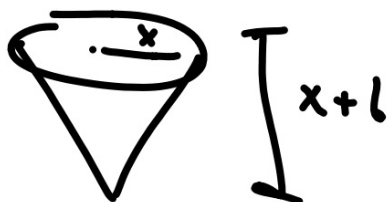
$$\begin{aligned} x &= -3 \\ x &= \frac{-3 \pm \sqrt{5}}{2} \end{aligned}$$

$$\begin{array}{l} \underline{+} \quad \underline{1, 4} \\ \textcircled{+} \quad 1 \\ \textcircled{-} \quad 3, 1 \end{array}$$

9. Find the number of possible positive zeros and the number of possible negative zeros for $F(x) = x^4 - 4x^3 + 3x^2 + 4x - 4$. Then determine the rational zeros. (Lesson 4-4)

④ 1

10. **Manufacturing** The Universal Paper Product Company makes cone-shaped drinking cups. The height of each cup is 6 centimeters more than the radius. If the volume of each cup is 27π cubic centimeters, find the dimensions of the cup. (Lesson 4-4)



radius 3 cm
height 9 cm

$$\begin{array}{r} 3 \overline{) 1 \ 6 \ 0 \ -81} \\ \underline{3 \ 27 \ 81} \\ 1 \ 9 \ 27 \ 0 \end{array}$$

$$V = \frac{1}{3} \pi r^2 h$$

$$3 \cdot 27\pi = \cancel{3} \cdot \frac{1}{\cancel{3}} \pi \cdot x^2 (x+6)$$

$$81 = x^3 + 6x^2$$

$$x^3 + 6x^2 - 81 = 0$$

$$\pm 1, 3, 9, 27, 81$$

$$x = 3$$

Possible positive rational roots: $f(x)$

List the possible rational roots of each equation. Then determine the rational roots.

10. $x^3 + 2x^2 - 5x - 6 = 0$

11. $x^3 - 2x^2 + x + 18 = 0$

Technically: Possible negative rational roots: $f(-x)$

But if you're will to take a chance...

Find the number of possible positive real zeros and the number of possible negative real zeros for each function. Then determine the rational zeros.

17. $f(x) = x^3 - 7x - 6$

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

