Slide 1

⑤
⑨

$$4x^3 + \ldots \ldots \div (4x+5)$$

$$3x + 5 + \dfrac{-(2x+3)}{2x^2+1}$$

$$2x^2+1 \,\overline{\big)\, 6x^3 + 10x^2 + x + 8}$$
$$\underline{-(6x^3 \qquad\quad 3x)}$$
$$10x^2 - 2x + 8$$
$$\underline{-(10x^2 \qquad + 5)}$$
$$-2x + 3$$

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Slide 2

2-3 continued   Real Zeros

f(x) is a polynomial function of degree n

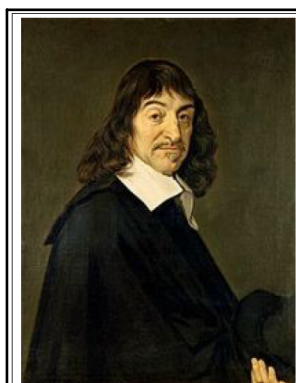f(x) has at most n real zeros $\qquad f(x) = 2x^3 + 5x^2 - 8x + 10$

Rational Zero Test -

All rational zeros are of the form

$$\dfrac{P}{q} \quad \begin{array}{l}\leftarrow \text{factors of last term} \\ \leftarrow \text{factors of the leading coefficient}\end{array}$$

$$\pm \dfrac{1, 2, 5, 10}{1, 2}$$

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Slide 3

Rene Descartes
1596-1650, La Haye, France

French philosopher, Descartes, combined algebra and geometry through his studies of mathematics to create analytical (Cartesian) geometry. He is also said to be the first to explain the universe in terms of math. Feeling as if the only certainty in life was mathematics, Descartes described it as the only concrete base for anything. His ideas continually impact mathematicians and philosophers around the globe.

Major Works:
- Discourse on the Method of Rightly Conducting the Reason and Seeking Truth in the Sciences
- Meditations on First Philosophy
- Principles of Philosophy

Rene Descartes
1596-1650

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Slide 4

Descartes' Rule of Signs -

\# of <u>positive</u> real zeros is
equal to the \# of sign
changes of $f(x)$
(or less than that by an even \#)

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Slide 5

Ex 1   How many positive and negative zeros are possible?

$$f(x) = 3x^5 + 2x^4 - 5x^3 + x^2 - 1$$

5 total zeros

3 positive zeros (or 1)

2 negative zeros (or 0)

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Slide 6

Ex 2   Find the real zeros of:

$$f(x) = 2x^3 + 3x^2 - 8x + 3 = (x-1)(2x^2 + 5x - 3)$$

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

$$1\,\underline{\rfloor\; 2 \quad 3 \quad -8 \quad 3}$$
$$ 2 \quad 5 \quad -3$$
$$\overline{ 2 \quad 5 \quad -3 \,|\, 0}$$

$$x = \left\{ 1, \tfrac{1}{2}, -3 \right\}$$

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Ex 3   Find the real zeros of:

$f(x) = x^3 + 8x^2 + 11x - 20 = (x-1)(x^2 + 9x + 20)$

$(x-1)(x+4)(x+5)$

$$
\begin{array}{r|rrr}
1 & 1 & 8 & 11 & -20 \\
  &   & 1 & 9 & 20 \\
\hline
  & 1 & 9 & 20 & 0
\end{array}
$$

$x = \{1, -4, -5\}$

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Homework
p.128
#43-55, 65-71 odds

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