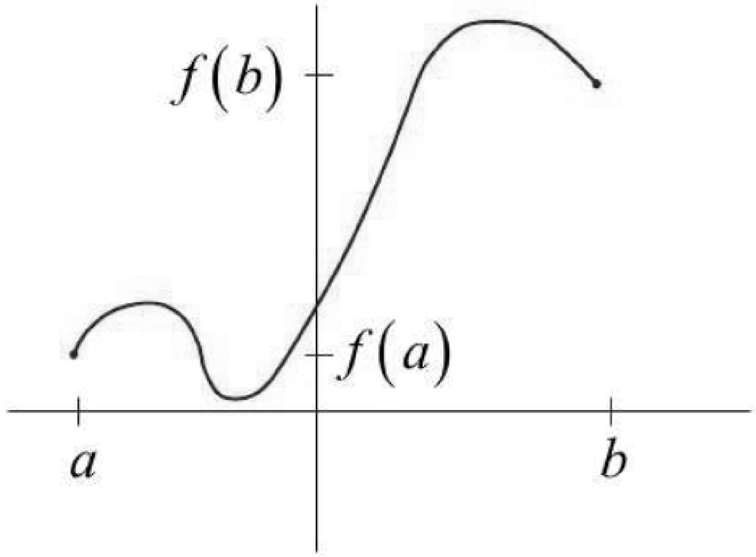
Using the IVT to determine of a function has a zero on a given interval If $f(a) < 0$ and $f(b) > 0$ we can conclude there is at least one zero in the interval [a,b] Or If $f(a) > 0$ and $f(b) < 0$ we can conclude there is at least one zero in the interval [a,b]	Intermediate Value Theorem: If a function is continuous between a and b, then it takes on every value between f(a) and f(b)  Because the function is continuous, it must take on every y value between f(a) and f(b) 1. Determine if $f(x) = 3x^2 + 4x - 4$ crosses the x-axis between $x = -5$ and $x = 0$. 2. Determine if $f(x) = 3x^2 + 4x - 4$ crosses the x-axis between $x = 1$ and $x = 5$.

What you'll Learn About

Divide f(x) by d(x) using factoring.

1) $f(x) = x^2 + 5x + 6$ $\quad d(x) = x + 2$

$$\frac{x^2+5x+6}{x+2} = \frac{\cancel{(x+2)}(x+3)}{\cancel{x+2}} = x+3$$

Divide f(x) by d(x) using long division.

2) $f(x) = x^2 + 5x + 6$ $\quad d(x) = x + 2$

$$\begin{array}{r} x+3 \\ x+2\,\overline{)\,x^2+5x+6} \\ -\,x^2+2x \\ \hline 3x+6 \\ -\,3x+6 \\ \hline 0 \end{array}$$

Divide f(x) by d(x) using synthetic division.

3) $f(x) = x^2 + 5x + 6$ $\quad d(x) = x + 2$ Zero

$x+2=0$
$x=-2$

$$\begin{array}{r|rrr} -2 & 1 & 5 & 6 \\ & & -2 & -6 \\ \hline & 1 & 3 & \boxed{0} \end{array}$$

$x+3$

	Divide f(x) by d(x) by using long division, and write a summary statement in polynomial form and fraction form. 1) $f(x) = 3x^3 + 5x^2 + 8x + 7 \quad d(x) = 3x + 2$ $$\begin{array}{r} x^2 + x + 2 \\ 3x+2 \overline{) 3x^3 + 5x^2 + 8x + 7} \\ -\underline{(3x^3 + 2x^2)} \\ 3x^2 + 8x \\ -\underline{(3x^2 + 2x)} \\ 6x + 7 \\ -\underline{(6x + 4)} \\ 3 \end{array}$$ $x^2 + x + 2 + \frac{3}{3x+2}$ Divide f(x) by d(x) by using synthetic division, and write a summary statement in polynomial form and fraction form. $3x+2=0$ 2) $f(x) = 3x^3 + 5x^2 + 8x + 7 \quad d(x) = 3x + 2$ $x = \frac{-2}{3}$ $$\begin{array}{r\|rrrr} -\frac{2}{3} & 3 & 5 & 8 & 7 \\ & & -2 & -2 & -4 \\ \hline & 3 & 3 & 6 & \boxed{3} \end{array}$$ $\frac{3\ 3\ 6}{3}$ $3x^2+3x+6+\frac{3}{3x+2} = x^2 + x + 2 + \frac{3}{3x+2}$