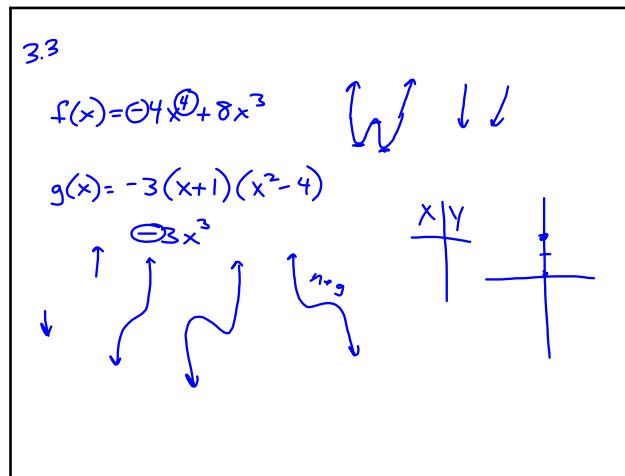


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Long Division

$$(8x^3 + 6x^2 + 3x + 14) \div (2x + 3)$$

$$\begin{array}{r} 4x^2 - 3x + 6 - \frac{4}{2x+3} \\ 2x+3 \overline{)8x^3 + 6x^2 + 3x + 14} \\ - (8x^3 + 12x^2) \\ \hline -6x^2 + 3x \\ + (+6x^2 + 9x) \\ \hline 12x + 14 \\ - (12x + 18) \\ \hline -4 \end{array}$$

$$x = -\frac{3}{2}$$

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$$(x^3 + 8x^2 + 6x - 7) \div (x + 7)$$

$$\begin{array}{r} x^3 \quad x^2 \quad 6 \quad -7 \\ \underline{-7} \mid 1 \quad 8 \quad 6 \quad -7 \\ \quad \quad \downarrow \quad -7 \quad -7 \quad 7 \\ \quad \quad 1 \quad 1 \quad -1 \quad 0 \end{array}$$

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

$$(x \quad)$$

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$$(x^3 - 2x^2 - 9x - 2) \div (x + 2)$$

$$\begin{array}{r} x^3 \quad x^2 \quad x \quad * \\ \underline{-2} \mid 1 \quad -2 \quad -9 \quad -2 \\ \downarrow \quad -2 \quad 8 \quad 2 \\ 1 \quad -4 \quad -1 \quad 0 \end{array}$$

$$1 - 4 - 1 - 2$$

$$x^2 - 4x - 1 \quad x^2 - 4x - 1 + \frac{2}{x+2}$$

Factor Theorem $(x+2)$ a factor

$$f(-2) = 0 \quad x+2=0 \quad x=-2$$

$$f(-2) = (-2)^3 - 2(-2)^2 - 9(-2) - 2 = 0$$

$$x+3 \text{ a factor}$$

$$f(-3) = (-3)^3 - 2(-3)^2 - 9(-3) - 2 = \text{no}$$

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$$h(x) = x^3 - 7x^2 + 11x + 3$$

3 is a zero
Express as a product of linear factors

$$3 \mid 1 \quad -7 \quad 11 \quad 3$$

$$\begin{array}{r} 3 \quad -12 \quad -3 \\ \hline 1 \quad -4 \quad -1 \quad 0 \end{array}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x^2 - 4x - 1$$

$$(x-3)(x-(2+\sqrt{5}))(x-(2-\sqrt{5})) = \frac{4 \pm \sqrt{16-4(1)(-1)}}{2(1)}$$

$$(x-3)(x-(2+\sqrt{5}))(x-(2-\sqrt{5})) \quad X = \frac{4 \pm \sqrt{16+4}}{2} = \frac{4 \pm \sqrt{20}}{2}$$

$$X = \frac{4 \pm \sqrt{4 \cdot 5}}{2} = \frac{4 \pm 2\sqrt{5}}{2}$$

$$X = 2 \pm \sqrt{5}$$

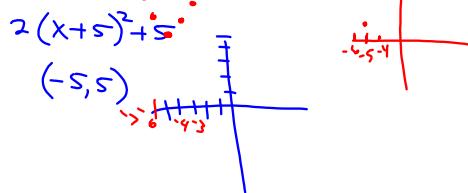
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graph

$$y = 2x^2 + 20x + 55$$

$$2(x^2 + 10x) + 55$$

$$2(x^2 + 10x + 25) + 55 - 50$$



$$f(x) = -3x^2 - 24x - 42$$

$$= -3(x^2 + 8x) - 42$$

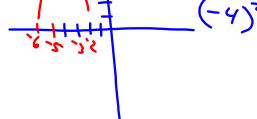
$$= -3(x^2 + 8x + 16) - 42 + 48$$

$$= -3(x + 4)^2 + 6$$

$$-5^2 = -25$$

$$\text{Vertex } (-4, 6)$$

$$(-5)^2 = 25$$



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$$f(x) = -x^2 - 3x + 7$$

$$= -2x - 3$$

$$-h - 2x - 3$$

$$x^4 \\ |x^3 + 1x^2 +$$

$$(-5)^2$$

$$g(x) = 2x - 2$$

$$r(x) = -2x^2 - 2$$

$$g(r(-5))$$

$$r(-5) = -2(-5)^2 - 2$$

$$= -50 - 2$$

$$= -52$$

$$2(-52) - 2$$

$$= 104 - 2 = -106$$

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