

① Subtract and simplify
 $(x^3 - 2x^2 + 3x + 5) - (3x^2 - 2x + 1)$

② Multiply and simplify
 $(x+2)(x^2 - 3x + 1)$

③ Use long division:

$$5x - 2 \overline{) -5x^2 + 7x - 8}$$

④ Factor completely:
 $3x^2 - 22x + 7$

⑤ Factor completely:
 $9x^3 - 25x$

⑥ Factor completely:
 $8x^3 + 27$

⑦ Factor completely by grouping:

$$x^3 - x + 2x^2 - 2$$

⑧ Reduce completely:

$$\frac{x^4 - 16x^2}{x^4 + 8x^3 + 16x^2}$$

⑨ Add and simplify

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

⑩ Simplify:

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

Be sure to reduce.

⑪ Divide and reduce

$$\frac{3x^2 + 6x}{x} \div \frac{2x + 4}{x^2}$$

⑫ Rationalize denominator and reduce:

$$\frac{4}{5 - \sqrt{3}}$$

⑬ Simplify, leaving answer in radical form.

$$\sqrt[3]{81a^8b^{12}}$$

⑭ Simplify and combine:

$$\sqrt{27} - 5\sqrt{48}$$

MAC 1105 EXAM I KEY (SU'09)

$$\begin{aligned} \textcircled{1} \quad & x^3 - 2x^2 + 3x + 5 - 3x^2 + 2x - 1 \\ & = x^3 - 5x^2 + 5x + 4 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & x^3 - 3x^2 + x + 2x^2 - 6x + 2 \\ & = x^3 - x^2 - 5x + 2 \end{aligned}$$

$$\begin{array}{r} \textcircled{3} \quad \overline{-x+1} \quad R-6 \\ 5x-2 \overline{) -5x^2+7x-8} \\ \underline{-5x^2+2x} \\ 5x-8 \\ \underline{5x+2} \\ -6 \end{array}$$

$$\textcircled{4} \quad (3x-1)(x-7)$$

$$\begin{aligned} \textcircled{5} \quad & x(9x^2 - 25) \\ & = x(3x+5)(3x-5) \end{aligned}$$

$$\textcircled{6} \quad (2x)^3 + 3^3 =$$

$$(2x+3)(4x^2 - 6x + 9)$$

$$\begin{aligned} \textcircled{7} \quad & x^3 - x + 2x^2 - 2 \\ & = x(x^2 - 1) + 2(x^2 - 1) \end{aligned}$$

$$\begin{aligned} & = (x^2 - 1)(x + 2) \\ & = (x+1)(x-1)(x+2) \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & \frac{x^2(x+4)(x-4)}{x^2(x^2+8x+16)} \\ & = \frac{(x+4)(x-4)}{(x+4)^2} = \frac{x-4}{x+4} \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & \frac{4x(x-1) + x + 2}{x^2 - 1} \\ & = \frac{4x^2 - 4x + x + 2}{x^2 - 1} \\ & = \frac{4x^2 - 3x + 2}{x^2 - 1} \end{aligned}$$

$\textcircled{10}$ Multiply each term by x^2 .
Get $\frac{x^2 + x}{x^2 - 1} = \frac{x(x+1)}{(x+1)(x-1)}$
 $= \frac{x}{x-1}$

$$\textcircled{11} \quad \frac{3x(x+2)}{x} \cdot \frac{x^2}{2(x+2)} = \frac{3x^2}{2}$$

$$\begin{aligned} \textcircled{12} \quad & \frac{4}{5-\sqrt{3}} \cdot \frac{5+\sqrt{3}}{5+\sqrt{3}} = \frac{4(5+\sqrt{3})}{25-3} \\ & = \frac{4(5+\sqrt{3})}{22} = \frac{2(5+\sqrt{3})}{11} \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad & \sqrt[3]{27a^6 b^{12} \cdot 3a^2} \\ & = 3a^2 b^4 \sqrt[3]{3a^2} \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad & 3\sqrt{3} - 5\sqrt{16 \cdot 3} \\ & = 3\sqrt{3} - 20\sqrt{3} \\ & = -17\sqrt{3} \end{aligned}$$