I. Do It Now: Use S.D. Fact. Thm. & Rem. Thm. to find P(c) if
\[ P(x) = 8x^3 - 15x^2 - 5x^3 + 2x^2 - 10x - 15 \land c = -2. \]

\[ \text{Sol: (Nobody did it)!} \]

1. Factor Thm.: "c is a zero of P \iff (x-c) is a factor of P(x)" (p. 269)

2. Remainder Thm.: "If the polynomial P(x) is divided by x-c, then the remainder is P(c)."

II. Work: a) Required find P(-2)

\[
\begin{array}{c|cccc}
  & 8 & -15 & 0 & 0 -5 & 2 & -10 & -15 \\
\hline
\hline
\end{array}
\]

b) S.D. Divide by x - (-2) = x + 2

By the Rem. Thm.: [P(-2) = -1931]

II. Use S.D.F.T. and/or Rem. Thm. to find P(c) if
\[ P(x) = x^3 - 23x + 41 \] and \[ c = 5. \]

\[ (x-c) \]

\[ \text{Sol.} \]

1. 5 | 1 0 -23 41

\[
\begin{array}{c|cc}
  & 5 & 25 & 10 \\
\hline
  & 1 & 5 & 2 (5) \\
\end{array}
\]

2: \[ P(5) = 51 \]
Slightly Different Question: Use SD to find

\[
\frac{x^3 - 23x + 41}{x-5} = x^2 + 5x + 2 + \frac{51}{x-5}
\]

1] Work:

\[
\begin{array}{c|cccc}
5 & 1 & 0 & -23 & 41 \\
 & & & 5 & 25 \\
\hline
 & & & 1 & 5 & 2 \\
\end{array}
\]


\[
\frac{x^3 - 23x + 41}{x-5} = (x-5)(x^2+5x+2) + 51
\]

Subs 5 for x on LHS, then to maintain "equality"
I must subs 5 for x on the RHS
So LHS is P(5) and RHS is 0 + 51 = 51.

IV] "Be a Teacher" - Make up a poly, with
pre-determined zeros. (See §3.2: p.271: #57-60.)

Degree 3: Zeros 1, 2, 5.

\[
P(x) = (x-1)(x-2)(x-5)
\]

\[
= (x^2 - 3x + 2)(x-5)
\]

\[
= x^3 - 3x^2 + 2x - 5x^2 + 15x - 10
\]

\[
= x^3 - 8x^2 + 17x - 10
\]

\[
P(x) = x^3 - 8x^2 + 17x - 10
\]