These are alleged answers. For each error herein, you get extra-credit points for being the first to report it by e-mail.

1 The lack of numerator variables makes this a candidate for a guess-and-check partial-fractions decomposition.

We note that
\[ x^2 - 2x - 15 = (x - 5)(x + 3) \]
and so we try
\[ \frac{1}{x - 5} - \frac{1}{x + 3} = \frac{8}{(x - 5)(x + 3)}, \]
which tells us that
\[
\int \frac{1}{x^2 - 2x - 15} \, dx = \frac{1}{8} \int \left( \frac{1}{x - 5} - \frac{1}{x + 3} \right) \, dx \\
= \frac{1}{8} (\ln(|x - 5|) - \ln(|x + 3|)) + C \\
= \ln \left( K \sqrt[8]{\frac{|x - 5|}{|x + 3|}} \right)
\]
2. We could guess and check our way through, but instead, we separate out the integrand from the calculus part of the process and write down what our text calls the “partial-fractions decomposition:

\[
\frac{2x - 50}{(x - 5)(x + 3)} = \frac{A}{x - 5} + \frac{B}{x + 3}.
\]

Putting the right-hand side together over a common denominator yields this identity:

\[
\frac{2x - 50}{(x - 5)(x + 3)} = \frac{A(x + 3) + B(x - 5)}{(x - 5)(x + 3)}.
\]

Equating numerators and collecting on the right yields the identity

\[
2x - 50 = (A + B)x + (3A - 5B).
\]

In order that this be an identity, we must have

\[
A + B = 2
\]
\[
3A - 5B = -50,
\]
from which system we get \(A = -5\) and \(B = 7\), which tells us that

\[
\int \frac{1}{x^2 - 2x - 15} \, dx = \int \left( \frac{-5}{x - 5} + \frac{7}{x + 3} \right) \, dx
\]

\[
= -5 \ln(|x - 5|) + 7 \ln(|x + 3|) + C
\]

\[
= \ln \left( K \frac{|x + 3|^7}{|x - 5|^5} \right)
\]