Round 5

A) $40x \geq 19x + 25000$ $\rightarrow$ $21x \geq 25000$ $\rightarrow$ $x \geq 1190.47+$ $\rightarrow$ $x_{min} = \underline{\mathbf{1191}}$

B) $|2x - 1| \leq 23$ $\rightarrow$ $-23 < 2x - 1 < +23$ $\rightarrow$ $-11 \leq x \leq +12$
   $|x + 1| > 4$ $\rightarrow$ $x + 1 < -4$ <u>or</u> $x + 1 > +4$ $\rightarrow$ $x < -5$ or $x > +3$

Thus, the overlap contains integers from -11 to -6 inclusive as well as integers from 4 to 12 inclusive, a total of $6 + 9 = \underline{\mathbf{15}}$ integers.

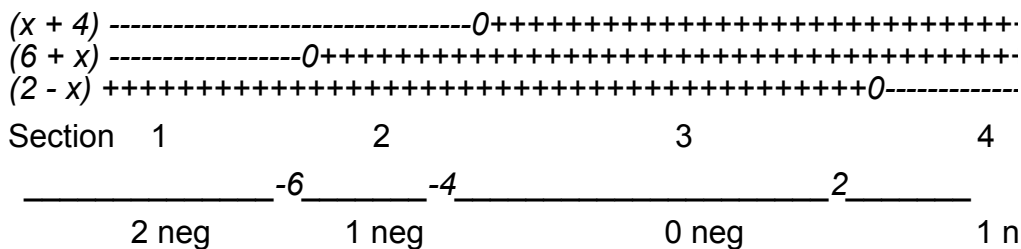C) The expression under the square root, i.e. the radicand, must be non-negative.

$$\frac{x+4}{12-4x-x^2} = \frac{x+4}{(6+x)(2-x)}$$ The critical values are -4, -6 and +2.

Two factors $(x + 4)$ and $(6 + x)$ are negative for values of x less than the critical value and positive for values of x greater than the critical value.
For $(2 - x)$ the situation is reversed.
The following diagram summarizes this situation:

```
(x + 4) --------------------------------0+++++++++++++++++++++++++++++·
(6 + x) -----------------0+++++++++++++++++++++++++++++++++++++++++++·
(2 - x) +++++++++++++++++++++++++++++++++++++++++++++++++0-------------
Section    1                    2                   3                 4
_____-6_____-4_____2_____
          2 neg            1 neg              0 neg             1 n
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Thus, in section 1 ($\underline{x < -6}$) and section 3 ($\underline{-4 \leq x < 2}$), the quotient is non-negative.
Note: Only -4 is included, since the other critical values would cause division by zero.