Q1. Evaluate the following prefix expression if all numbers are single digits:

   - / * 4 + 2 3 * 2 5 / + ^ 6 2 4 8

  - / * 4 + 2 3 * 2 5 / + ^ 6 2 4 8
= - / * 4 (+ 2 3) (* 2 5) / + (^ 6 2) 4 8   Group the binary operator expression
= - / * 4 5 10 / + 36 4 8   Evaluate
= - / (* 4 5) 10 / (+ 36 4) 8   Group the binary operator expression
= - / 20 10 / 40 8   Evaluate
= - (/ 20 10) (/ 40 8)   Group the binary operator expression
= - 2 5   Evaluate
= -3

Answer: D.

Q2. The formula for the surface area of a right circular cylinder is: $A = 2\pi rh + 2\pi r^2$
Convert the entire formula to postfix using P for π.

$A = 2\pi rh + 2\pi r^2$
A = 2 * P * r * h + 2 * P * r ^ 2   Convert to operator/operand expression
A = 2 * P * r * h + 2 * P * r ^ 2   Group according to the precedence
A = ((((2 * P) * r) * h) + 2 * P * (r ^ 2))   Continue grouping
A = ((((2 * P) * r) * h) + ((2 * P) * (r ^ 2)))   Continue grouping
A = ((((2 * P) * r) * h) + ((2 * P) * (r ^ 2)))   Convert to postfix
A = ((((2 P *) * r) * h) + ((2 P *) * (r 2 ^)))   Continue conversion from inner-most unconverted groups
A = ((((2 P *) r *) h *) + ((2 P *) (r 2 ^) *))   Continue conversion from inner-most unconverted groups
A = ((((2 P *) r *) h *) ((2 P *) (r 2 ^) *) +)   Make sure to follow the precedence to convert
A ((((2 P *) r *) h *) ((2 P *) (r 2 ^) *) +) =   Remove all parenthesis after conversion is done
A 2 P * r * h * 2 P * r 2 ^ * + =

Answer: C.

Q3. Evaluate the following expression: ((LSHIFT-1 11011) OR (RCIRC-2 01101) AND 01111)

  ((LSHIFT-1 11011) OR (RCIRC-2 01101) AND 01111)   Solve LSHIFT-1 and RCIRC-2
= (10110 OR 01011 AND 01111)   AND has a higher precedence
= (10110 OR 01011)   When AND on all 1's, keep the matching mixed portion
= 11111

Answer: A.

Q4. How many bit strings make the following equation TRUE? ((LCIRC-3 X) AND 10110) = 10100

  ((LCIRC-3 X) AND 10110) = 10100   Let X be "abcde"
=> ((LCIRC-3 abcde) AND 10110) = 10100   Solve LCIRC-3
=> (deabc AND 10110) = 10100   Zero out the variable bits
=> d0ab0 = 10100   d = 1, a = 1, b = 0, c and e can be either 0 or 1.

So there are 4 variations totally

Answer: C.

Q5. Evaluate the following LISP expression: (CDR (CAR '((b c d) (e f) g)))

Notice: (C**A**R x) **take** the first item from list x, (C**D**R x) **delete** the first item from list x

  (CDR (CAR <u>'((b c d) (e f) g)</u>))   Underlined is a literal that should not evaluate
                              "((b c d) (e f) g)" is a list with 3 items
= (CDR ((b c d)))   1st item: (b c d), 2nd item: (e f), 3rd item: g
= (c d)

Answer: D.