5. Find all solutions of the equations below.

(a) \( t^2 - 8t + 18 = 3 \)  \( \Rightarrow \)  \( t^2 - 8t + 15 = 0 \)
\((t-5)(t-3) = 0\)
\( \Rightarrow \)  \( t = 5 \) or \( t = 3 \)

(b) \( x - \sqrt{17 - 8x} = 3 \)

(i) \( x - 3 = \sqrt{17 - 8x} \)
\((x-3)^2 = 17 - 8x \)
\( x^2 - 6x + 9 = 17 - 8x \)
\( x^2 + 2x - 8 = 0 \)
\((x + 4)(x - 2) = 0 \)
\( \Rightarrow \)  \( x = -4 \) or \( x = 2 \)

(ii) \( x - 3 = \sqrt{17 - 8x} \)
\((x-3)^2 = 17 - 8x \)
\( x^2 - 6x + 9 = 17 - 8x \)
\( x^2 + 2x - 8 = 0 \)
\((x + 4)(x - 2) = 0 \)
\( \Rightarrow \)  \( x = -4 \) or \( x = 2 \)

(c) \( x^4 - 4x^2 + 3 = 0 \)
\( (x^2 - 3)(x^2 - 1) = 0 \)
\( \Rightarrow \)  \( x^2 - 3 = 0 \) or \( x^2 - 1 = 0 \)
\( x = \pm \sqrt{3} \) or \( x = \pm 1 \)

(d) \( 3x^2 - 6x = -\frac{1}{2} \)
\( 3x^2 - 6x + \frac{1}{2} = 0 \)
\( x = \frac{6 \pm \sqrt{36 - 4(3)(\frac{1}{2})}}{2(3)} \)
\( = \frac{1 \pm \sqrt{36 - 6}}{6} \)
\( = \frac{1 \pm \sqrt{30}}{6} \)

No credit for solving
\((x-a)(x-b) = c \)
where \( c \neq 0 \)

Note, since we squared both sides in step (2), we must check for extraneous solutions.

When \( x = 2 \), subs into (1)
\(-1 = \sqrt{17 - 16} \)
which is not possible
Thus \( x = 2 \) is extraneous.

When \( x = -4 \), subs into (1)
\(-7 = \sqrt{17 - 8(-4)} \)
which is not possible
Thus \( x = -4 \) is extraneous.

No solutions!

\( x_1 = 3 \) same soln set
\( x_2 = 1 \)