MS 100 College Algebra Test Two Hanson Jr. Sigrah

Problems one to three: Solve by the method of your choice, if the solutions involve imaginary numbers, then write the solution(s) as a complex number. Note that in question two the variable is Φ [phi].

1. $-10x^2 - 340x + 350 = 0$

2. $\Phi^2 - \Phi - 1 = 0$

3. $x^2 - 8x + 41 = 0$

4. Add $(7 - 4i) + (7 + 4i)$

5. Multiply $(7 - 4i)(7 + 4i)$

6. Multiply $(x - 7 - 4i)(x - 7 + 4i)$

7. Solve for x: $x - \sqrt{x} = 6$

8. Solve and sketch answer on a number line: $-4x - 7 \leq 13$

9. One of the types of runs I enjoy doing in the evenings is an accelerating out and back. I start slow and gradually pick up the pace over a three to five kilometer distance. If I do this type of run properly I hit my maximum pace and maximum speed as I return to Piyuul. During this type of run my heart rate in beats per minute steadily climbs to near my maximum heart rate. For the time interval t in minutes $0 \leq t \leq 30$ my heart rate can be approximated by the function* (where t is the time in minutes):
heart rate in beats per minute $= -0.17t^2 + 8.5t + 79$

   a. What is my heart rate at t = 0, the start of my run?

   b. For me, a heart rate above 180 beats per minute is not sustainable for more than a few minutes. At what time t will my heart rate be equal to 180 beats per minute? Hint: set the function equal to 180.

   c. Find the vertex x-value by setting the slope equation to zero and solving for x: $2at + b = 0$

   d. Use the vertex x-value to find the vertex y-value.

   e. The vertex y-value represents the maximum heart rate I will reach on the run. If it exceeds 200 I risk injuring my heart. Based on part d. above, will I likely exceed 200 beats per minute?

* Based on actual data gathered with a Polar heart rate monitor on an actual out and back run to Fulkrin.

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