Problem set for Seminar 1

See www.kth.se/social/course/SF1625 for information about how the seminars work and what you are expected to do during the seminars. At this seminar you are to hand in a solution to a problem. Solve the problems 1-4 below and write down the solutions, one solution per sheet of paper. Write your name and peronal number. When the seminar begins you will be told which problem to hand in. Before you start working on the problems below you should solve the recommended exercises from the text book:
Chapter P1: 7, 11, 19, 29, 39. Chapter P2: 13, 15, 17, 23. Chapter P3: 3, 7, 43, 49. Chapter P4: 1, 3, 7, 11, 31, 33, 53. Chapter P5: 9, 25. Chapter P6: 1, 7, 17. Chapter P7: 1, 3, 7, 19, 25, 26, 51.

PROBLEMS

Uppgift 1. Factor these real polynomials as far as possible.
   A. $f(x) = x^2 + x + 3$
   B. $g(x) = x^2 - x - 2$
   C. $h(x) = 2x^4 - 2x^2 - 8x - 8$

Uppgift 2. Solve these trigonometric equations. Be careful to find *all* solutions.
   A. $\sin x = 1/2$
   B. $\cos 2x = -1/\sqrt{2}$
   C. $\tan 3x = \sqrt{3}$

Uppgift 3. Solve these real equations. Is it possible to solve them in several different ways?
   A. $|x - 1| = 3$
   B. $|2x + 1| = 2$
   C. $|2x + 1| = |x|$

Uppgift 4. Answer these questions:
   A. If f is an odd function and $f(-1) = 2$, what can you say about $f(1)$?
   B. If f is an even function and $f(-1) = 2$, what can you say about $f(1)$?
   C. What is the domain of definition of $g(t) = 1/\sqrt{1 - 2t}$?
   D. What is the domain of definition of $h(t) = 1/(6x^2 + 12x - 48)$?

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DISCUSSION PROBLEMS

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Here are a few extra problems to discuss at the seminar. You do not have to write down solutions in advance.

- Does there exist a function that is both even and odd?

- Does there exist a function that is neither even nor odd?

- Let $f(x) = x$ and $g(x) = x^2/x$. Are f and g different functions?

- A curve in the xy-plane is given by the equation $x^2 + 2x + y^2 - 4y = 4$. Draw the curve! Is it a graph, , $y = f(x)$, for some function f?

- True or false?

    P1. $x = 2 \implies x^2 = 4$.
    P2. $x^2 = 4 \implies x = 2$.
    P3. $x \sin x = x \implies \sin x = 1$.

- Sign in a food store: We sell beer to those who are at least 18 years old. What do they mean? What does it say on the sign? Is it the same? Can you formulate the relevant propositions using "implies" or an implication arrow?