

## EXAM 2 - MATH 140

DATE: Friday, October 7

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Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. (a) Solve the radical equation  $\sqrt{x+1} + \sqrt{x-1} = \sqrt{2x+1}$ .  
(b) Solve the absolute value inequality  $\frac{1}{2} + |\frac{2x-1}{3}| \leq 1$
2. (a) Solve the absolute value equation  $|x^2 + x - 1| = 1$ .  
(b) Consider the piece-wise defined function

$$f(x) = \begin{cases} -x, & \text{if } -1 < x \leq 2 \\ (x-3)^3, & \text{if } 2 \leq x \leq 4 \\ -\frac{3}{2}x + \frac{21}{2}, & \text{if } 4 < x \leq 7 \end{cases}$$

Find its domain and sketch carefully its graph clearly depicting all necessary points.

3. Starting from the graph of the function  $f(x) = x^2$ , perform all necessary transformations to graph the function  $g(x) = (2-x)^2 - 1$ . (Show me clearly all the step-by-step transformations involved and produce the accompanying intermediate graphs carefully.)
4. Find the intercepts, produce the sign table and then roughly sketch the graph of the polynomial function  $f(x) = (x-4)(x+2)^2(2-x)$ .
5. Find the domain, the intercepts, the asymptotes, produce the sign table and then roughly sketch the graph of the rational function  $f(x) = \frac{x^2+x-2}{x^2+9x+20}$ .
6. (a) Solve the polynomial inequality  $x^3 - x^2 - 2x \leq 0$   
(b) Solve the rational inequality  $\frac{-x^2+8x-12}{x^2-8x+16} \geq 0$ .