MATH 164 Pre-Test

Name: KEY SID: _____

Instructions

Work all problems out on the provided scratch paper, using one side only. Be sure to number each problem and page (if they are not already numbered) and staple them (in order) to this cover sheet at the end of the exam. Be sure that all your work is visible after stapling. In order to receive full credit, you must:

- Fully justify each answer.
- Organize your work so that your line of reasoning is clear.
- Write neatly and legibly.
- Circle your final answer where appropriate.

Unless otherwise specified, calculators are not allowed.

Problems

1. Evaluate and simplify if possible.
   (a) $\frac{200}{36} \cdot \frac{30}{500}$
   (b) $\frac{1}{3} + \frac{3}{7} - \frac{7}{5}$
   (c) $\frac{a^5 + a^3b^2 + 1}{5a + 3b}$
   (d) $\frac{a^5b^3 + b^2}{b^5}$
   (e) $\frac{1}{x} - \frac{1}{x+1}$
2. Multiply and simplify.
   (a) $(a + b)(a - b)$
   (b) $(3x - 2)(7x + 5)$
   (c) $(x^2 + x + 1)(x - 1)$
3. Factor if possible.
   (a) $x^2 - 25$
   (b) $x^2 + 2x + 1$
   (c) $x^2 - 5x + 6$
   (d) $x^2 + x - 2$
   (e) $x^2 + xy - 2y^2$
4. Solve each equation for x. If there is more than one solution, list all of them. If there is no solution, state this. Assume all values are real.
   (a) $3x + 2 = 1$
   (b) $9x^2 - 1 = 0$
   (c) $(x^2 + 1)(x^2 - 2)(2x + 1)(x - 5) = 0$
   (d) $\frac{x - 5}{x + 4} = 0$
   (e) $\frac{3}{x} = x^2$

1a $\frac{200}{36} \cdot \frac{30}{500} = \frac{60}{36 \cdot 5} = \frac{10}{6 \cdot 5} = \boxed{\frac{1}{3}}$

1b $\frac{1}{3} + \frac{3}{7} - \frac{7}{5} = \frac{7 \cdot 5 + 3^2 \cdot 5 - 7^2 \cdot 3}{3 \cdot 5 \cdot 7} = \frac{35 + 45 - 147}{105} = \frac{80 - 147}{105} = \boxed{-\frac{67}{105}}$

~~147~~
~~80~~

1c Can't simplify

1d $\frac{(a^5 b + 1) b^2}{b^5} = \boxed{\frac{a^5 b + 1}{b^3}}$

1e $\frac{1}{x} - \frac{1}{x+1} = \frac{x+1 - x}{x(x+1)} = \boxed{\frac{1}{x(x+1)}}$

2a $(a+b)(a-b) = a^2 - ab + ba - b^2 = \boxed{a^2 - b^2}$

2b $(3x-2)(7x+5) = 21x^2 + 15x - 14x - 10 = \boxed{21x^2 + x - 10}$

2c $(x^2+x+1)(x-1) = x^3 + x^2 + x - x^2 - x - 1 = \boxed{x^3 - 1}$

3a $x^2 - 25 = \boxed{(x-5)(x+5)}$

3b $x^2 + 2x + 1 = \boxed{(x+1)^2}$

3c $x^2 - 5x + 6 = \boxed{(x-3)(x-2)}$

3d $x^2 + x - 2 = \boxed{(x+2)(x-1)}$

3e $x^2 + xy - 2y^2 = \boxed{(x+2y)(x-y)}$

4a $3x + 2 = 1 \Rightarrow 3x = -1 \Rightarrow \boxed{x = -1/3}$

4b $9x^2 - 1 = 0 \Rightarrow x^2 = 1/9 \Rightarrow \boxed{x = \pm 1/3}$

4c $(x^2+1)\underbrace{(x^2-2)}_{\pm\sqrt{2}}\underbrace{(2x+1)}_{-1/2}\underbrace{(x-5)}_{5} = 0 \Rightarrow \boxed{x = \pm\sqrt{2}, -1/2, 5}$

4d $\frac{x-5}{x+4} = 0 \Rightarrow x - 5 = 0 \Rightarrow \boxed{x = 5}$

4e
~~5d~~
$\frac{3}{x} = x^2 \Rightarrow 3 = x^3 \Rightarrow \boxed{x = \sqrt[3]{3}}$