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Math 114 Algebra and Trigonometry
Exam One
Instructor: Jun Chen

No calculator allowed.
Write detailed work to obtain full credits.

Your Name:

Please circle your TA session:

| TA NAME | section time | section time |
|---------|--------------|--------------|
| Case | 9:55am | 11am |
| Hua | 8:50am | 2:25pm |
| Sripada | 12:05pm | 1:20pm |

| Problem/pt | Score |
|------------|-------|
| P1/20 | |
| P2/25 | |
| P3/20 | |
| P4/15 | |
| P5/20 | |
| Total/100 | |

1. (20 pt) Simplify the following expressions:

(a) $\sqrt[3]{\frac{3x^4}{y}} \sqrt[3]{\frac{x^2y^4}{3^4}}$ (suppose x, y are positive, write the expression in exponent form).

(b) $\frac{\sqrt{a-1}+\sqrt{a}}{\sqrt{a-1}-\sqrt{a}}$ (rationalize the denominator, expand the numerator).

2. (25 pt) Let $f(x) = -x^2 - x - 3$.
- (a) Solve the quadratic equation $f(x) = 0$.
 - (b) Find the vertex of the parabola $y = f(x)$.
 - (c) Sketch the graph of $y = f(x)$.

3. (20 pt) Solve the inequality

$$\frac{x^3 + 2x}{x^2 - 2x - 3} > 0.$$

4. (15 pt) Find the equation of the line passing through $(2, 1)$ and perpendicular to line $y = 2x - 3$.

5. (20 pt) Start with the graph of $y = |x|$, sketch the graph of $y = -2|x|+1$ by stretching, shifting and reflection. Draw the pictures separately for each step. Is $-2|x|+1$ an even or odd function? Verify your judgement by definitions of even or odd functions.