

Name: _____

Directions: Show all work. No credit for answers without work.

1. [2 points] Simplify the following expressions if possible.

(a) $(x^2 + x^2)^3$

(b) $\sqrt{x^2 + y^2}$

2. [2 points] Let a , b , c , and d be integers. Express the sum $\frac{a}{b} + \frac{c}{d}$ as a single fraction.

3. [2 points] Suppose that the following are true:

- Every northern town is covered in snow.
- Every western town has a sheriff.
- If a town does not have a sheriff, then it is lawless.
- Raystone Point is clear of snow.
- Eight Springs has a sheriff.

Decide whether each of the following statements is true, false, or undecidable from the given facts; circle one option. (For this problem, you do not need to show your work.)

- | | |
|--|------------------------|
| (a) Raystone Point is a northern town. | True False Undecidable |
| (b) Eight Springs is a not a lawless town. | True False Undecidable |
| (c) Eight Springs is a western town. | True False Undecidable |
| (d) Raystone Point has a sheriff or it is lawless (or both). | True False Undecidable |

4. **[2 points]** Initially, a class has 100 students. After 20 men and 20 women add the class, the ratio of men to women is 2 to 3. How many men were in the class initially? How many women were in the class initially?

5. **[2 points]** Find the derivatives of the following functions.

(a) $f(x) = x^3 + \sqrt{x}$

(b) $f(x) = \sin(\cos(x))$.