Instructions: Show all work. Give exact answers (improper fractions) and do no round unless specifically asked to do so. If you work the problem in your calculator you can write keystrokes to show work for partial credit.

1. If a is an integer and $a \neq 0$, which expressions are always positive, and which always negative? (It's possible neither is a response.)

   a. a^3

   either

   c. a^4

   always positive

   e. $(-a)^3$

   either

   b. $(-a)^4$

   always positive

   d. $-(a)^3$

   either

   f. $-(a)^4$

   always negative

2. Simplify $\left(\frac{3 \cdot (-2)^2 + 5}{7^2 - 8 \div (-4)}\right)^2$

   $= \left(\frac{3 \cdot 4 + 5}{49 + 2}\right)^2 = \left(\frac{12 + 5}{51}\right)^2 = \left(\frac{17}{51}\right)^2 = \left(\frac{1}{3}\right)^2 = \frac{1}{9}$

3. Simplify the following expression as much as possible. $\left(\frac{4^2 - 2(-13)(1)}{7 \cdot 3}\right)^2$

   $\left(\frac{16 + 26}{21}\right)^2 = \left(\frac{42}{21}\right)^2 = (2)^2 = 4$