

Name:

Exam 1

Sec 4  
Winter 2019  
Exam 1

Name: \_\_\_\_\_

Time Limit: 90 min

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- **DO NOT open the exam booklet until you are told to begin. You should write your name and section number at the top and read the instructions.**

- Organize your work, in a reasonably neat and coherent way, in the space provided. If you wish for something to not be graded, please strike it out neatly. I will grade only work on the exam paper, unless you clearly indicate your desire for me to grade work on additional pages.

- You may use any results from class, homework or the text, but you must cite the result you are using. You must prove everything else.

- You needn't spend your time rewriting definitions or axioms on the exam.

- When you have completed your test, hand it to me and go have a great weekend!

| Problem | Points | Score |
|---------|--------|-------|
| 1       | 6      |       |
| 2       | 9      |       |
| 3       | 9      |       |
| 4       | 9      |       |
| 5       | 9      |       |
| Total:  | 42     |       |

1. Evaluate the following expressions. Do not use a calculator and show all your work.

(a) (3 points)  $2 \cdot (4 - 3 \cdot (5 - 1) \div 2)$

(b) (3 points)  $\frac{(4 + 3 \cdot 4)}{2^3 - 2} \cdot (4 \cdot 8 \div 2)$

2. Simplify the following expressions and write with only positive exponents.

(a) (3 points)  $\left( \frac{x^{-1}y^2}{y^3x} \right)$

(b) (3 points)  $\frac{2a^3b^4 + 8b^2}{4a^2b} \div (5a^{-1}b^3)$

(c) (3 points)  $(-2a)^{-3}b^3(3a^2b^{-1})^2$

3. Completely factor the following expressions.

(a) (3 points)  $2x^2 - 4x + xy - 2y$

(b) (3 points)  $-2x^3 + 2x^2 + 4x$

(c) (3 points)  $9 - (2x + 1)^2$

4. Simplify each expression

(a) (3 points)  $\frac{x - 8}{x^2 + x - 72}$

(b) (3 points)  $\frac{y^2 - 9}{y^2} \div \frac{y^5 + 3y^4}{y + 2}$

(c) (3 points)  $\frac{3x}{x^2 - x - 2} - \frac{2 + x}{x^2 - 1}$

5. Evaluate or express in terms of a radical which cannot be simplified. There should be no radicals left in denominators.

(a) (3 points)  $\left(-\frac{8}{27}\right)^{2/3}$

(b) (3 points)  $\frac{\sqrt{3} - \sqrt{5}}{\sqrt{3} + \sqrt{7}}$

(c) (3 points)  $\sqrt{48}$

## Formulas

### Exponents

$$a^0 = 1$$

$$a^m \cdot a^n = a^{m+n}$$

$$\frac{a^n}{a^m} = a^{n-m}$$

$$(a^n)^m = a^{mn}$$

$$(ab)^n = a^n b^n$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$$

### Product/factors

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$a^2 - b^2 = (a-b)(a+b)$$

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

### Radicals

$$\sqrt[n]{xy} = \sqrt[n]{x} \sqrt[n]{y}$$

$$\sqrt[n]{\frac{x}{y}} = \frac{\sqrt[n]{x}}{\sqrt[n]{y}}$$

$$x^{\frac{m}{n}} = \sqrt[n]{x^m} = (\sqrt[n]{x})^m$$