

Math 172-Quiz # 4

November 15, 2013

Name: _____

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Total: 40 Points

1. [3 points] Calculate the following and write your answer in scientific notation.

$$\frac{0.00000036}{400,000 \times 0.03} = \frac{3.6 \times 10^{-7}}{4 \times 10^5 \times 3 \times 10^{-2}}$$

$$= \frac{3.6 \times 10^{-7}}{12 \times 10^3}$$

$$= \frac{36 \times 10^{-8}}{12 \times 10^3} = 3 \times 10^{-11}$$

3 × 10⁻¹¹

2. [4 points] Evaluate the following.

a) $\frac{-2^{-3}}{(-4)^{-2}}$

$$= \frac{-(-4)^2}{2^3}$$

$$= -\frac{16}{8} = -2$$

-2

b) $(\frac{1}{2})^{-3} (\frac{4}{3})^{-2}$

$$= 2^3 (\frac{3}{4})^2$$

$$= 8 (\frac{9}{16})$$

$$= \frac{9}{2}$$

$\frac{9}{2}$

3. [3 points] Simplify the following expression. Use only positive exponents in your answer.

$$\frac{a^{-1}b^{-7}}{a^2(-5a^3b^3)^{-2}}$$

$$= \frac{a^{-1}b^{-7}(-5a^3b^3)^2}{a^2}$$

$$= \frac{a^{-1}b^{-7}(-5)^2 a^6 b^6}{a^2}$$

$$= \frac{25 a^5 b^{-1}}{a^2} = \frac{25 a^3}{b}$$

$\frac{25a^3}{b}$

4. [11 points] Factor the following polynomials **completely**:

a) $3x^3 + 12x^2 + 12x$ $3x(x+2)^2$
 $= 3x(x^2 + 4x + 4)$
 $= 3x(x+2)^2$

b) $6x^3z - 42x^2z + 30xz$ $6xz(x^2 - 7x + 5)$
 $= 6xz(\underbrace{x^2 - 7x + 5}_{\text{prime}})$

c) $7x^3 - 56y^3$ $7(x-2y)(x^2 + 2xy + 4y^2)$
 $= 7(x^3 - 8y^3)$
 $= 7(x-2y)(x^2 + 2xy + 4y^2)$

d) $4y^{2r} + 5y^r - 6$ $(y^r + 2)(4y^r - 3)$
 $= 4m^2 + 5m - 6$ let $m = y^r$
 $= 4m^2 - 3m + 8m - 6$ $(-3, 8)$
 $= m(4m - 3) + 2(4m - 3)$
 $= (m + 2)(4m - 3)$
 $= (y^r + 2)(4y^r - 3)$

5. [10 points] Find the solution set for the following equations.

a) $m^3 + 7m^2 - 4m - 28 = 0$

$\{2, -2, -7\}$

[3]

$$m^2(m+7) - 4(m+7) = 0$$

$$(m^2 - 4)(m+7) = 0$$

$$(m-2)(m+2)(m+7) = 0$$

$$m = 2, -2, -7$$

b) $(y-5)(y-6) = 2$

$\{4, 7\}$

[3]

$$y^2 - 6y - 5y + 30 = 2$$

$$y^2 - 11y + 28 = 0$$

$$(y-4)(y-7) = 0$$

$$y = 4, 7$$

c) $6a^3 = -7a^2 + 3a$

$$6a^3 + 7a^2 - 3a = 0$$

$\{0, \frac{1}{3}, -\frac{3}{2}\}$

[4]

$$a(6a^2 + 7a - 3) = 0$$

$(9, -2)$

$$a(3a-1)(2a+3) = 0$$

$$6a^2 + 7a - 3$$

$$= 6a^2 + 9a - 2a - 3$$

$$= 3a(2a+3) - (2a+3)$$

$$= (3a-1)(2a+3)$$

$$a = 0$$

$$3a - 1 = 0$$

$$3a = 1$$

$$a = \frac{1}{3}$$

$$2a + 3 = 0$$

$$2a = -3$$

$$a = -\frac{3}{2}$$

6. [3 points] Find the product of the two polynomials.

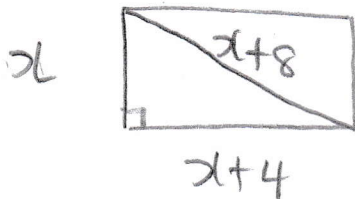
$$(3x^{n+2} - x^n)(5x^{2n+3} - x^{2n+1})$$

$$\begin{array}{r} 3n+5 \quad 3n+3 \quad 3n+1 \\ 15x \quad -8x \quad +x \end{array}$$

$$= 15x^{3n+5} - 3x^{3n+3} - 5x^{3n+3} + x^{3n+1}$$

$$= 15x^{3n+5} - 8x^{3n+3} + x^{3n+1}$$

7. [6 points] The length of a rectangular yard is four feet longer than its width. The diagonal distance across the yard is eight feet longer than the yard's width. Find the dimensions of the yard.



Let $x = \text{width}$ (ft) ①
 $x+4 = \text{length}$
 $x+8 = \text{diagonal}$

$$x^2 + (x+4)^2 = (x+8)^2 \quad \text{②}$$

$$x^2 + x^2 + 8x + 16 = x^2 + 16x + 64$$

$$x^2 - 8x - 48 = 0$$

$$(x-12)(x+4) = 0 \quad \text{②}$$

$$x = 12, \quad \cancel{x = -4}$$

The width is 12 feet and the length is 16 feet. ①