

Math 1030, Exam #3, Summer 2014

Name

KEY

Instructions: Show all work. Use exact answers unless specifically asked to round. Reduce as much as possible. Be sure to answer all parts of each question. Be sure to declare your variables in word problems and state units in your final answer.

1. Simplify the expression and write the final answer in scientific notation. (6 points each)

a. $0.0000012 \times \frac{.0002}{5,000,000}$

$$4.8 \times 10^{-17}$$

b. $(5 \times 10^4)^4 \cdot 6 \times 10^{-7}$

$$3.75 \times 10^{12}$$

2. Factor completely, or state that the polynomial is prime. (7 points each)

a. $16q^4 - 81$

$$(4q^2 - 9)(4q^2 + 9) = (2q - 3)(2q + 3)(4q^2 + 9)$$

b. $9a^2 - 150a + 625$

$$(3a - 25)^2$$

c. $27b^3 - 125y^3$

$$(3b - 5y)(9b^2 + 15by + 25y^2)$$

d. $4h^2 + 81$

prime

e. $4(x + 1) - y(x + 1)$

$$(x+1)(4-y)$$

f. $2q^2 + 5q + 3$

$$(2q+3)(q+1)$$

g. $9st + 3s + 3t + 1$

$$3s(3t+1) + 1(3t+1) = (3t+1)(3s+1)$$

h. $(b + 4)^2 - c^2$

$$[(b+4)-c][(b+4)+c]$$

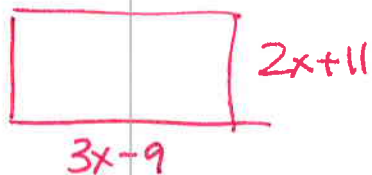
i. $z^2 + 7z + 12$

$$(z+3)(z+4)$$

j. $12m^5 + 4m^4 - 11m^3$

$$m^3(12m^2 + 4m - 11)$$

3. Write an expression for the area of a rectangle whose length is $3x - 9$ and whose width is $2x + 11$. (5 points)



$$(2x+11)(3x-9) = 6x^2 - 18x + 33x - 99 = 6x^2 + 15x - 99$$

4. If the height of a projectile is given by the equation $h = -16t^2 + 96$, at what time does the object hit the ground? (7 points)

$$0 = -16t^2 + 96$$

$$-16(t^2 - 6) = 0$$

$$t = \sqrt{6} \approx 2.449...$$

hits the ground

5. Solve the equations for the variable. State all possible solutions. (8 points)

a. $(n+1)(n-4)(2n-7) = 0$

$$n+1=0 \Rightarrow n=-1$$

$$n-4=0 \Rightarrow n=4$$

$$2n-7=0 \Rightarrow \frac{2n}{2} = \frac{7}{2} \Rightarrow n = \frac{7}{2}$$

$$\left\{ -1, 4, \frac{7}{2} \right\}$$

b. $h^2 + 6h - 16 = 0$

$$(h+8)(h-2) = 0$$

$$h = -8, h = 2$$

$$\{-8, 2\}$$

c. $8v^2 - 12v + 1 = 64 - 2v$

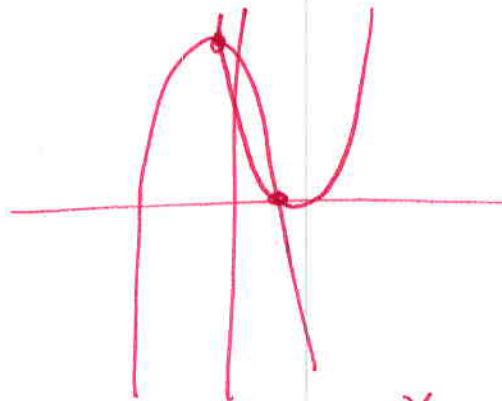
$$8v^2 - 10v - 63 = 0$$

$$(2v - 7)(4v + 9) = 0$$

$$v = \frac{7}{2}, v = -\frac{9}{4}$$

$$\{-\frac{9}{4}, \frac{7}{2}\}$$

6. Solve the equation $3x^2 - 11x + 10 = -2x^2 - 2x + 9$ by graphing method. Sketch the graph you obtain from your calculator. Round your answer(s) to two decimal places. (8 points)



$$x = .118975$$

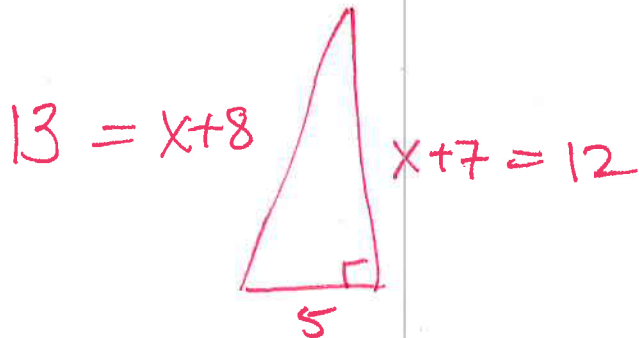
$$x \approx .12$$

$$x = 1.681025$$

$$x \approx 1.68$$

$$x \approx \{.12, 1.68\}$$

7. If a right triangle has one leg of length 5, and another of length $x + 7$, and the hypotenuse is $x + 8$.
 8. Find the length of the sides of the triangle. (8 points)



$$25 + (x+7)^2 = (x+8)^2$$

$$25 + x^2 + 14x + 49 = x^2 + 16x + 64$$

$$10 = 2x \quad x = 5$$

8. Divide the polynomial $x^3 + 11x^2 + 17x - 44$ by $(x + 4)$ and use that information to factor the original polynomial. (9 points)

$$\begin{array}{r}
 \overline{) x^3 + 11x^2 + 17x - 44} \\
 \underline{x^3 + 4x^2} \\
 7x^2 + 17x \\
 \underline{- 7x^2 + 28x} \\
 -11x - 44 \\
 \underline{-11x - 44} \\
 0
 \end{array}$$

$(x+4)(x^2+7x-11)$ This does not factor further