Math 71 – Spring 2008 Name:

QUIZ #2 @ 50 points

Write in a neat and organized fashion. Write your complete solutions on SEPARATE PAPER. You should use a pencil. For an exercise to be complete there needs to be a detailed solution to the problem. Do not just write down an answer. No proof, no credit given! Clearly label each exercise.

1. If $f(x)=x+1$, and $g(x)=x^2-2x+3$. Find the following and simplify:

a) $f(a+h)-f(a)$

b) $(f+g)(x)$

c) $(f-g)(x)$

d) $(fg)(-1)$

2. Factor each polynomial completely:

a) $9t^2-15t+4$

b) $x^2-5x-24$

c) a^3+8b^3

d) $2x^4--6x-x^3y+3y$

e) $1-81x^4$

3. Solve each equation by factoring:

a) $t^3=64t$

b) $(x-3)(x+8)=-30$

d) $-5(4x+7)\left(2x-\frac{1}{5}\right)(3x^2-7x)=0$

e) $\frac{1}{4}y^2-\frac{5}{2}y+6=0$

f) $x(x-2)^3-35(x-2)^2=0$

4. A tree is supported by a wire anchored in the ground 15 feet from its base. The wire is 4 feet longer than the height that it reaches on the tree. Find the length of the wire.

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Quiz 2- solutions

(1) $f(x) = x+1$

$g(x) = x^2 - 2x + 3$

(a) $f(a+h) - f(a) =$

$((a+h)+1) - (a+1) =$

$a+h+1-a-1 = h$

(b) $(f+g)(x) = f(x) + g(x)$

$= (x+1) + (x^2 - 2x + 3)$

$= x+1+x^2-2x+3$

$= x^2 - x + 4$

(c) $(f-g)(x) = f(x) - g(x)$

$= (x+1) - (x^2 - 2x + 3)$

$= x+1-x^2+2x-3$

$= -x^2 + 3x - 2$

(d) $(fg)(-1) = f(-1)\,g(-1)$

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

$= 0$

(b) $x^2 - 5x - 24 = (x+3)(x-8)$

product $= c = -24 <$ $+3$, -8

sum $= b = -5$

$24 = 8 \cdot 3$

(c) $a^3 + 8b^3 = a^3 + (2b)^3$

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

$= (a+2b)(a^2 - 2ab + 4b^2)$

(d) $2x^4 - 6x - x^3y + 3y =$

$= 2x(x^3 - 3) - y(x^3 - 3)$

$= (x^3 - 3)(2x - y)$

(e) $1 - 81x^4 = 1 - (9x^2)^2$

$= (1 - 9x^2)(1 + 9x^2)$

$= (1 - (3x)^2)(1 + 9x^2)$

$= (1-3x)(1+3x)(1+9x^2)$

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(2) (a) $9t^2 - 15t + 4 = \%$

we'll split middle term:

product $= ac = 36 <$ -12, -3

sum $= b = -15$

$36 = 12 \cdot 3$

$\% = 9t^2 - 12t - 3t + 4$

$= 3t(3t-4) - (3t-4)$

$= (3t-4)(3t-1)$

(3) (a) $t^3 = 64t$

$t^3 - 64t = 0$

$t(t^2 - 64) = 0$

$t(t-8)(t+8) = 0$

$t = 0$ or

$t - 8 = 0 \Rightarrow t = 8$ or

$t + 8 = 0 \Rightarrow t = -8$

$t \in \{0, 8, -8\}$

(b) $(x-3)(x+8) = -30$

$x^2 + 8x - 3x - 24 + 30 = 0$

$x^2 + 5x + 6 = 0$

$(x+3)(x+2) = 0$

$x+3 = 0$ or $x+2 = 0$

$x = -3$ $\quad x = -2$

$x \in \{-3, -2\}$

(d) $-5(4x+7)(2x - \frac{1}{5})(3x^2 - 7x) = 0$

$4x+7 = 0 \Rightarrow 4x = -7$

$x = -\frac{7}{4}$

OR

$2x - \frac{1}{5} = 0 \Rightarrow 2x = \frac{1}{5}$

$x = \frac{1}{10}$

OR

$3x^2 - 7x = 0 \Rightarrow x(3x-7) = 0$

$x = 0$ OR $3x - 7 = 0$

$x = \frac{7}{3}$

$x \in \{-\frac{7}{4}, \frac{1}{10}, 0, \frac{7}{3}\}$

(e) $\frac{1}{4}y^2 - \frac{5}{2}y + 6 = 0 \quad / \cdot 4$

$y^2 - 10y + 24 = 0$

$(y-6)(y-4) = 0$

$y-6 = 0$ OR $y-4 = 0$

$y = 6$ $\quad y = 4$

$y \in \{6, 4\}$

(f) $x(x-2)^3 - 35(x-2)^2 = 0$

$(x-2)^2(x(x-2) - 35) = 0$

$(x-2)^2(x^2 - 2x - 35) = 0$

$(x-2)^2(x-7)(x+5) = 0$

$x-2 = 0 \Rightarrow x = 2$

OR

$x-7 = 0 \Rightarrow x = 7$

OR

$x+5 = 0 \Rightarrow x = -5$

$x \in \{2, 7, -5\}$

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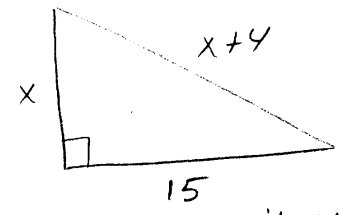
(4)



let x = height it reaches on the tree

Pythagorean theorem $\Rightarrow$

$x^2 + 15^2 = (x+4)^2$

$x^2 + 225 = x^2 + 8x + 16$

$8x = 225 - 16$

$8x = 209$

$x = \frac{209}{8}$

Then, the length of the wire is

$x + 4 = \frac{209}{8} + 4 = \frac{209 + 32}{8}$

$= \frac{241}{8} = 30\frac{1}{8}$ ft