Math 099 - Summer 2014 - Test 3

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Instructions. Only calculators are allowed on this examination. Each problem is worth 10 points. Always use the appropriate wording and units of measure in your answers (when applicable). **SHOW YOUR WORK NEATLY, PLEASE (no work, no credit).**

1. Perform the indicated operation by removing the parentheses and combining like terms.

$$(6x + 10) - (7x^3 - 3x)$$

$6x+10-7x^3-(-3x)$

$6x+10-7x^3+3x$

$\boxed{-7x^3+9x+10}$

2. Evaluate the given polynomial at $x = -1$.

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

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

$= -1-2+1$

$= -2$

3. Multiply the polynomials using the distributive property and combine like terms.

$$(2x + 3)(4 - x)$$

$2x(4-x)+3(4-x)$

$8x-2x^2+12-3x$

$\boxed{-2x^2+5x+12}$

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4. Find the product of the binomial factors using the appropriate special product (difference of two squares, square of a binomial sum, or square of a binomial difference).

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

SQUARE OF A BINOMIAL DIFFERENCE: $(A-B)^2 = A^2 - 2AB + B^2$

HERE $A = 2x$, $B = 3$: $(2x-3)^2 = (2x)^2 - 2(2x)(3) + 3^2$

$= 4x^2 - 12x + 9$

5. Write in decimal form the product $(3.125 \times 10^5)(6.01 \times 10^{-3})$.

$(3.125E5)(6.01E-3) = 1878.125$

6. Simplify the expression using the properties of exponents. (Note that the answer should contain only positive exponents and please be sure to expand any numerical portion of the answer.)

$$\left(\frac{3a^{-2}b}{6\,a^{-3}b^2}\right)^3 =$$

$= \left(\frac{3}{6} a^{-2-(-3)} b^{1-2}\right)^3$

$= \left(\frac{1}{2} a b^{-1}\right)^3$

$= \left(\frac{1}{2}\right)^3 a^3 b^{-3} = \frac{1}{8} a^3 b^{-3}$

$= \boxed{\frac{a^3}{8b^3}}$

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7. Divide the polynomial in the numerator by the monomial in the denominator.

$$\frac{-3x^5 + 2x^3 - x + 6}{6x^3}$$

$$\frac{-3x^5}{6x^3} + \frac{2x^3}{6x^3} + \frac{-x}{6x^3} + \frac{6}{6x^3}$$

$$\boxed{-\frac{1}{2}x^2 + \frac{1}{3} - \frac{1}{6x^2} + \frac{1}{x^3}}$$

8. Completely factor the expression by grouping. If the polynomial cannot be factored, write "Not factorable by grouping".

$$\underbrace{5sy + 6ap}_{\text{WON'T WORK}} \quad \underbrace{- ps - 30ay}_{\text{WON'T WORK}}$$

REWRITE:

$$\underbrace{5sy - ps} + \underbrace{6ap - 30ay}$$

$$s(5y - p) + 6a(p - 5y)$$

$$s(5y - p) - 6a(5y - p)$$

$$(5y - p)(s - 6a)$$

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9. Factor the trinomial. If the trinomial cannot be factored (using rational numbers), write *not factorable*.

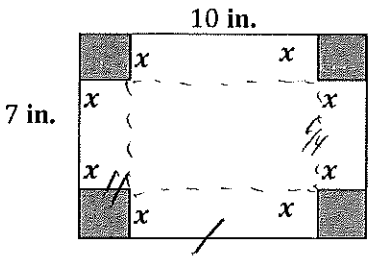
$$3x^2 - 11x - 10$$

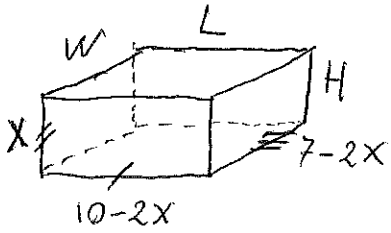
PRODUCT $= (-10)(3) = -30 \rightarrow \pm(1,-30),\ \pm(2,-15),\ \pm(3,-10),\ \pm(5,-6)$

SUM $= -11$

NONE OF THE PAIRS HAS SUM -11, SO **NOT-FACTORABLE** WITH THIS METHOD.

10. A 7 inches by 10 inches rectangular cardboard is given. A small square is cut out from each corner of the original rectangle.





The remaining portion of cardboard is folded so to form an open box (without lid). Represent the volume of the open box in the form of a (simplified) polynomial function $V(x)$, where x is the side (in inches) of the square being cut off.

VOLUME $= L \cdot W \cdot H$

$L = 10 - x - x = 10 - 2x$

$W = 7 - x - x = 7 - 2x$

$H = x$

$$V(x) = (10-2x)(7-2x)x$$
$$= (10-2x)(7x-2x^2)$$
$$= 70x - 20x^2 - 14x^2 + 4x^3$$

$$V(x) = 4x^3 - 34x^2 + 70x \quad \text{CUBIC INCHES}$$

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