MAT 099 Test 4

100 Points Name KEY

1. (2 pts each) Evaluate each of the following:

a. -5^2 $= -25$

b. $(-5)^2$ $= 25$

c. -5^3 $= -125$

d. $(-5)^3$ $= -125$

e. -5^0 $= -1$

f. $(-5)^0$ $= 1$

2. (2 pts each) Simplify each of the following and writing using positive exponents.

a. $\dfrac{3a^{-5}b^3}{18a^2b^{-3}} = \dfrac{1}{6}a^{-5-2}b^{3-(-3)} = \dfrac{1}{6}a^{-7}b^6 = \dfrac{b^6}{6a^7}$

b. $\left(\dfrac{2^3x^{-1}y^5}{6^{-2}x^2y^{-1}}\right)^2 = \left(\dfrac{2^3}{(2\cdot3)^{-2}}x^{-1-2}y^{5-(-1)}\right)^2 = \left(\dfrac{2^3}{2^{-2}3^{-2}}\cdot x^{-3}y^6\right)^2$

$= \left(\dfrac{2^5}{3^{-2}}\right)^2(x^{-3})^2(y^6)^2 = \dfrac{2^{10}}{3^{-4}}x^{-6}y^{12} = \boxed{\dfrac{2^{10}\cdot3^4y^{12}}{x^6}}$

c. $\dfrac{(2^3x^{-1}y^5)^3}{(6^{-2}x^2y^{-1})^{-2}} = \dfrac{2^9x^{-3}y^{15}}{6^4x^{-4}y^2} = \dfrac{2^9}{(2\cdot3)^4}x^{-3-(-4)}y^{15-2}$

$= \dfrac{2^9}{2^4\cdot3^4}x^1y^{13} = \boxed{\dfrac{2^5}{3^4}xy^{13}}$

d. $5^{-1}-2^{-3} = \dfrac{1}{5}-\dfrac{1}{8} = \dfrac{8-5}{40} = \boxed{\dfrac{3}{40}}$

20 pts

3. (2 pts each) Write each of the following in standard notation:

a. 9.1×10^{-5} = .000091

00.00009.1

b. 1.9×10^{8} = 190,000,000

1.900000000

4. (2 pts each) Write each of the following in scientific notation:

a. 0.0000003278 = 3.278×10^{-7}

b. 1,333,564 = 1.333564×10^{6}

5. (2 pts each) Simplify. Express final answer in scientific notation.

a. $\dfrac{1.2\times10^{22}}{3\times10^{-3}}$ = $.4\times10^{25}$

= 4×10^{24}

b. $(5.3\times10^{6})(8\times10^{-3})$ =

42.4×10^{3} = 4.24×10^{4}

6. (2 pts each) Let $P(x)=2x^2-3x+7$. Find each of the following:

a. $P(2)$ $= 2(2)^2-3(2)+7 = 8-6+7 =$ 9

b. $P\left(\frac{1}{3}\right) = 2\left(\frac{1}{3}\right)^2-3\left(\frac{1}{3}\right)+7 = 2\left(\frac{1}{9}\right)-1+7$

$= \frac{2}{9}+6 = \frac{2}{9}+\frac{54}{9} = \frac{56}{9}$

7. (2 pts each) Perform the indicated operations:

a. $(x+5)(x-7)$ = $x^2-7x+5x-35$ = $x^2-2x-35$

b. $(x+2)(x^2-5x+4)$ = x^3-5x^2+4x

$+2x^2-10x+8$

x^3-3x^2-6x+8

20 pts

c. $(3x+2)(3x-2) = (3x)^2-(2)^2 = \boxed{9x^2-4}$

d. $(3x-2)^2 = (3x)^2 - 2(3x)(2) + 2^2 = \boxed{9x^2-12x+4}$

8. (2 pts each) Factor out the GCF:

a. $5x^5-15x^4+20x^2$

$= 5x^2(x^3-3x^2+4)$

b. $6x(4x+3)-5(4x+3)$

$= (4x+3)(6x-5)$

9. (5 pts each) Factor by grouping:

a. $24x^2+18x-20x-15$

$= 6x(4x+3) - 5(4x+3) = \boxed{(4x+3)(6x-5)}$

b. $10x^2-20x-x+2$

$= 10x(x-2) - 1(x-2) = \boxed{(x-2)(10x-1)}$

10. (5 pts each) Factor each trinomial.

a. $x^2+3x-18 = \boxed{(x+6)(x-3)}$

$(12)(-21) = (2)(2)(3)(-1)(3)(7) = -252$

$+18 - 14$

$4 = 5-1$ -5

$= 14-10$ -140

$= 24-20$ -480

$= 20-16$ -320

$= 19-15$ -285

$= 18-14$ -252 ✓

b. $12x^2+4x-21$

$12x^2+18x-14x-21$

$= 6x(2x+3) - 7(2x+3)$

$= \boxed{(2x+3)(6x-7)}$

c. $x^2-8x+16 = (x-4)^2$

33 pts

2|150
3|75
5|25
5

2|96
2|48
2|24
2|12
2|6
3

GCF = 6

11. (4 pts each) Factor each binomial.

a. $x^2 - 16$ $= (x-4)(x+4)$

b. $150x^2 - 96$ $= 6(25x^2 - 16)$
$= 6(5x-4)(5x+4)$

c. $3y^3 + 81$ $= 3(y^3+27) = 3(y^3+3^3) = 3(y+3)(y^2-3y+9)$

12. (5 pts each) Solve each of the following equations by factoring.

a. $x^2 + 3x - 18 = 0$

$(x+6)(x-3) = 0$

$x \in \{-6, 3\}$

b. $(2x+1)(x+1) = 3$

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

$2x^2 + 3x - 2 = 0$

$(2x-1)(x+2) = 0$

$2x - 1 = 0$ $\quad$ $x + 2 = 0$

$2x = 1$ $\quad$ $x = -2$

$x = \frac{1}{2}$

$x \in \{-2, \frac{1}{2}\}$

13. (5 pts) Amanda can clean the windows of Benedetto's trophy home in 12 hours. Steve, a much lazier window washer, can do the job in 15 hours. Steve doesn't show up until ~~10:00 a.m.~~ 9:00 am to help. Amanda starts a 6 a.m. What time will the job be finished?

Let x = the amt of time Amanda spends working (in hrs)

y = " " " " " Steve " " " "

Then $y = x - 3$

$\frac{1}{12}x + \frac{1}{15}(x-3) = 1$ $\quad$ LCD = 60

$5x + 4(x-3) = 60$

$5x + x - 12 = 60$

$9x = 72$

$x = 8$ hrs

Amanda is done @ 2pm

6 am + 8 hrs =
14:00, or 2pm

27 pts