Winter 2014 Math 123a Test 3 Name: SOLUTION

Show all necessary work neatly, clearly, and systematically. Any understatement and/or incorrect statement may be penalized. There is a total of 104 points available to grab. Good Luck! BOX YOUR FINAL ANSWERS

1. (3) Multiply: $(3x-2)(2x^2-3x-7)$

$= 6x^3 - 9x^2 - 21x - 4x^2 + 6x + 14$

$= 6x^3 - 13x^2 - 15x + 14$

2. (3) Multiply: $(3x-8y)(5x-6y)$

$= 15x^2 - 18xy - 40xy + 48y^2$

$= 15x^2 - 58xy + 48y^2$

3. (3) Simplify: $(2x-7y)^2$

$= 4x^2 - 2(2x)(7y) + 49y^2$

$= 4x^2 - 28xy + 49y^2$

4. (4) Simplify: $(2x-3)^3$

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

$= (4x^2 - 12x + 9)(2x-3)$

$= 8x^3 - 12x^2 - 24x^2 + 36x + 18x - 27$

$= 8x^3 - 36x^2 + 54x - 27$

5. (1) Write in decimal notation: 2.785×10^6

2785000

6. (1) Write in scientific notation: 0.000325

3.25×10^{-4}

7. (4) Divide and write the answer in scientific notation: $\dfrac{3.2\times10^{-21}}{8\times10^{-17}}$

$= 0.4 \times 10^{-21} \times 10^{17}$

$= 0.4 \times 10^{-4}$

$= 4 \times 10^{-1} \times 10^{-4}$

$= 4 \times 10^{-5}$

8. (4) Simplify: $\dfrac{-54x^{-3}y^{-14}z^8}{-63x^6y^{-7}z^{-2}}$

$= \dfrac{6\ y^7 z^8 z^2}{7 x^3 x^6 y^{14}}$

$= \dfrac{6\ z^{10}}{7 x^9 y^7}$

9. (5) Simplify: $(-2x^{-2}y^3)^{-4}(-3x^{-3}y^{-2})^3$

$= (-2)^{-4} x^8 y^{-12} (-3)^3 x^{-9} y^{-6}$

$= \dfrac{1}{(-2)^4} x^{-1} y^{-18} (-27)$

$= -\dfrac{27}{16 x y^{18}}$

10. (5) Simplify: $-4x^6y^6(-3x^7y^9)^2 - 6x^2(x^3y^4)^6$

$= -4x^6y^6(9x^{14}y^{18}) - 6x^2(x^{18}y^{24})$

$= -36x^{20}y^{24} - 6x^{20}y^{24}$

$= -42x^{20}y^{24}$

11. (4) Divide: $\dfrac{10x^2y - 8xy + 6x^2}{4x^2y}$

$= \dfrac{10x^2y}{4x^2y} - \dfrac{8xy}{4x^2y} + \dfrac{6x^2}{4x^2y}$

$= \dfrac{5}{2} - \dfrac{2}{x} + \dfrac{3}{2y}$

12. (5) Divide: $(2x^2+11x-21)\div(2x-3)$

$$2x-3\,\overline{)\,2x^2+11x-21}$$

$x+7$

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

$14x-21$

$-(14x-21)$

0

$x+7$

13. (6) Divide: $(2x^3-7x^2+3)\div(x^2-3)$

$$x^2+0x-3\,\overline{)\,2x^3-7x^2+0x+3}$$

$2x-7$

$-(2x^3+0x^2-6x)$

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

$-(-7x^2+0x+21)$

$6x-18$

$2x-7+\dfrac{6x-18}{x^2-3}$

14. (4) Factorize completely: $2x^3+3x^2-8x-12$

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

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

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

15. (3) Factorize: $x^2-5xy-14y^2$

$=(x+2y)(x-7y)$

16. (4) Factorize completely: $3x^3+3x^2y-18xy^2$

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

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

17. (3) Factorize: $64x^2-48xy+9y^2$ $=(8x-3y)^2$

$8x$, $2\cdot 24xy$, $3y$

18. (4) Factorize completely: $81x^4-16y^8$

$=(9x^2)^2-(4y^4)^2$

$=(9x^2+4y^4)(9x^2-4y^4)$

$=(9x^2+4y^4)(3x+2y^2)(3x-2y^2)$

19. (4) Factorize: $64x^3+27y^6$

$=(4x)^3+(3y^2)^3$

$=(4x+3y^2)\left[(4x)^2-(4x)(3y^2)+(3y^2)^2\right]$

$=(4x+3y^2)(16x^2-12xy^2+9y^4)$

20. (5) Factorize completely:
$45a^3b-78a^2b^2+24ab^3$

$3ab(15a^2-26ab+8b^2)$

$3ab(5a-2b)(3a-4b)$

21. (4) Factorize: $45a^3b-78a^2b^2+24ab^3$

(same as #20)

22. (3) Factorize: $15a^2 - 14ab - 8b^2$

$= (5a + 2b)(3a - 4b)$

23. (3) Solve: $2x^2 = 6 + x$

$2x^2 - x - 6 = 0$

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

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

$2x = -3$ $\quad x_2 = 2$

$x_1 = -\frac{3}{2}$

24. (3) Solve: $x(x+3) = 28$

$x^2 + 3x = 28$

$x^2 + 3x - 28 = 0$

$(x+7)(x-4) = 0$

$x + 7 = 0$ or $x - 4 = 0$

$x_1 = -7$ $\quad x_2 = 4$

25. (4) Solve: $(x+4)(x+3) = 72$

$x^2 + 7x + 12 = 72$

$x^2 + 7x + 12 - 72 = 0$

$x^2 + 7x - 60 = 0$

$(x+12)(x-5) = 0$

$x + 12 = 0$ or $x - 5 = 0$

$x_1 = -12$ $\quad x_2 = 5$

26. (5) Solve: $2x^3 + 24x = 19x^2$

$2x^3 - 19x^2 + 24x = 0$

$x(2x^2 - 19x + 24) = 0$

$x(2x-3)(x-8) = 0$

$x_1 = 0$ or $2x - 3 = 0$ or $x - 8 = 0$

$2x = 3$ $\quad x_3 = 8$

$x_2 = \frac{3}{2}$

27. (4) Simplify: $(-3xy^{-2})^{-4}(-2x^{-3}y)^3$

$= \left(-\frac{3x}{y^2}\right)^{-4}\left(-\frac{2y}{x^3}\right)^3$

$= \left(-\frac{y^2}{3x}\right)^4\left(-\frac{2y}{x^3}\right)^3$

$= \frac{y^8}{81x^4} \cdot \left(-\frac{8y^3}{x^9}\right)$

$= -\frac{8y^{11}}{81x^{13}}$

28. (3) Compute: $34.001^2 - 33.999^2$

$= (34.001 + 33.999)(34.001 - 33.999)$

$= 68 \cdot 0.002$

$= 0.136$