Math 1030
Final Review

Summer 2009

1 Unit conversion

Problem 1. *You need to water a lawn that measures* 212 *feet by* 49 *feet. The law requires* 0.29 *gallons of water per square yard each time you water. How much will you pay each time you water the lawn if a City Corporation charges* $0.007 *per gallon?*

Problem 2. *You plan to travel to Europe. You will take a* $1,553$ *kilometer trip and you find out that the cost of gas is* $4.89 *per gallon. The car that you would like to rent uses* 1 *liter of gas for every* 19 *kilometers that you drive. How much money will you spend on gas on this trip? (Remember that* 1 *liter is* 0.2642 *gallons).*

2 Interest

Problem 3. *If you deposit* $459 *now and you can get an APR of* 3.59% *compounded quarterly, how much will you have in* 16 *years?*

Problem 4. *If you deposit* 150 *now and you can get an APR of* 3.41% *compounded continuously, how much will you have in* 15 *years?*

3 Exponential change

Problem 5. *Your car is worth* $31,205$. *If the value of your car is depreciating at a rate of* 18% *per year, how much will your car be worth* 8 *years later?*

Problem 6. *This is about a computer virus. On* 1 *January 2008 the virus had already infected* $4,592$ *computers. The number of infected computers increases by* 82% *per day. How many computers will be infected on 23 January 2008?*

4 Percentages

Problem 7. *The smoking rate among a certain population jumped* 63%*, up to* 13%*. What percentage of the population smoked before the increase? Round to the nearest integer percentage.*

Problem 8. *A* 2008 *Porsche* 911 *can be purchases for* $\$81,478$*. A* 1998 *Lamborghini Diablo costs* $\$245,623$*. What percentage more does the Lamborghini cost than the Porsche?*

5 Geometry

Problem 9. *I have a model car. Every dimension of the model is* $1/18$ *of the dimension of the car it models. So we say that it is a* $1/18$ *scale model. Curious about the volume of the car, I set up an experiment: I bought a tank that measures* 4 *feet by* 3 *feet and filled it with water. When I put the model into the tank, the water level rose by* 0.24 *inches. What is the volume of the real car? Give your answer in cubic feet.*

Problem 10. *The water drum of the water tower in Kuna, Idaho has the shape of a right circular cylinder with a semi-sphere top. The radius of the cylinder is* 3.2 *meters. The height of the cylinder (not including the semi-sphere cap) is* 6.0 *meters. Water flows into the tank at a rate of* 0.051 *cubic yards per second. How many minutes will it take until the tank is full? Give your answer in terms of minutes.*

6 Linear modeling

Problem 11. *Tomorrow morning there will be* 3 *inches of snow on the ground. Then the winter storm will start and snow will accumulate at a constant rate of* 4 *inches every* 3 *hours. How long will it take for the height of the snow to reach* 14 *inches?*

Problem 12. *In July 2000, you measured the circumference of a tree in the park. It was* 15 *inches. In July 2004, you measured that the circumference*

of the same tree was 31 *inches. Assume that the circumference grew at a constant rate. How old will the tree be when its circumference is* 141 *inches?*

7 Exponential modeling

Problem 13. *A community of rabbits has a doubling time of* 3.4 *months. How long will it take for the population to become* 5.6 *times the initial population? Give your answer in months.*

Problem 14. *Suppose that* 982 *pounds of Pu-*239 *is deposited at a nuclear waste site in Southern Utah. The half-lfie of plutonium is* $24,000$ *years. How much will be left after* $110,574$ *years?*

8 Savings plan formula

Problem 15. *I would like to have* $\$1,940,994$ *dollars when I retire in* 40 *years. I have a savings account that pays an APR of* 5.7% *compounded* 5 *times per year. If I make regular deposits* 5 *times per year, how large should my deposits be?*

9 Finding half-life

Problem 16. *A population of rats decreases by* 32.3% *each month. Determine the half-life of the rat population.*

Problem 17. *A certain medication breaks down in the human body at a rate of* 9% *per hour. Determine the approximate half-life. Express your answer in terms of hours. Round your answer to the nearest tenth.*

10 Venn diagrams

Problem 18. *At an international conference on air quality,* 43 *of the* 199 *Americans were attorneys and* 92 *of the* 129 *non-Americans were attorneys. How many non-Americans were not attorneys?*

11 Loan payment formula

Problem 19. *You are buying a home for* $\$132,762$. *The bank offers you an APR of* 6.3% *on a fixed rate* 30 *year loan. The bank also offers you an*

APR of 5.3% *on a fixed rate* 20 *year loan. How much less interest will you pay over the duration of the loan if you choose the* 20 *year loan instead of the* 30 *year loan?*