MATH 1030: Midterm 2 Practice Exam

The following are practice problems for the second exam.

1. Linus has a savings account that compounds monthly at an APR of 5.32%.
   (a) Find the APY of Linus' account.
   (b) If Linus deposits $350 per month for 18 years, how much will he have after the 18 years? How much of that will have been earned in interest?
   (c) If Linus wants to have $125,000 10 years from now, how much should he deposit each month for the 10 years?
2. Pauline's bank offers her a loan that compounds monthly at an APR of 7.87%.
   (a) If Pauline takes out a 9-year loan for $48,000, how much will her monthly payment be? How much will she pay over the course of the 9 years?
   (b) If Pauline can afford to pay $800 per month for 9 years towards a loan, how much can she afford to borrow?
3. Willie's new bank account compounds continuously with an APR of 6.2%.
   (a) If Willie wants to have $150,000 in 10 years so he can put a down payment on a house, how much should he put into the account now?
   (b) Willie decides instead that he wants to retire with this account. He would like to have $60,000 a year to live off of. How much does he need in his account to live off of the interest alone?
4. The number of ants on Harold's ant farm is doubling every 7 months.
   (a) Find the time it takes for the number of ants to triple.
   (b) If there were 1,250 ants two months ago, how many ants are on Harold's farm now?
   (c) If there were 1,250 ants two months ago, how many months ago were there 200 ants?
5. The frequency of ghost sightings is decreasing at a rate of 8.2% per year.
   (a) Find the number of years it takes for the frequency of ghost sightings to be cut in half.
   (b) If there are 88 ghost sightings per month this year, how many ghost sightings per month will there be in 11 years? How many ghost sightings per month were there 5 years ago?
   (c) If there are 88 ghost sightings per month this year, when will there only be 2 ghost sightings per month? When were there 500 ghost sightings per month?
6. The number of fruit flies at Eleanor's compost is increasing at a rate of 2.1% per day.
   (a) How often does the number of fruit flies double? How often does the number triple?
   (b) If there are 465 fruit flies today, how many fruit flies were there 4 weeks ago? How many fruit flies will there be 1 year from now?
   (c) If there are 465 fruit flies today, when will the number of fruit flies reach 2,000?

7. Argon-41 has a half-life of 1.827 hours.

   (a) How long does it take for a quantity of Argon to decrease to 10% of its original amount?

   (b) Suppose that 1 hour ago Jasper had 50mg of Argon-41. How much Argon-41 is left right now? When will Jasper only have 10mg of Argon-41?

   (c) If Jasmine has 100mg of Argon-41 right now, how long ago did she have 150mg of Argon-41. How much will she have 1 day from now?

   (d) What is the domain and range of this problem? What are the dependent and independent variables?

8. Suppose that the number of wormless apples on Exeter's apple tree is decreasing at a linear rate. Further suppose that he had 85 wormless apples 4 days after he began harvesting and 60 wormless apples 8 days after he began harvesting.

   (a) Find a linear equation that describes the number of wormless apples in Exeter's tree as a function of the number of days since he began harvesting.

   (b) How many wormless apples did he have the day he began harvesting? How many wormless apples did he have 15 days after he began harvesting?

   (c) How many days after he began harvesting apples were there 30 wormless apples?

   (d) What is the domain and range of this problem? What are the dependent and independent variables?

9. The price of robot vacuums is increasing by \$4.10 per month and on average they already cost \$280!

   (a) Find a linear equation that describes the price or robot vacuums as a function of the number of months from right now.

   (b) How much will robot vacuums cost one year from now?

   (c) When will robot vacuums cost \$1,000?