WORKSHEET (8B,9C - Exponential growth and decay)

1. The current population of a threatened animal species has a half-life of 10 years.

- a) How long will it take for this population to reach a third of the original size?
- b) If the population is 500,000 now, when will it reach 175,000?
- c) Find the approximate rate of change.
- d) Find the exact rate of change.
- 2. A community of rabbits grows at a rate of 8.5% per month.
- a) Find the exact doubling time.
- b) If the population is 150 now, what will it be 3 years later?
- c) If the population is 150 now, how long will it take to reach 2,000?
- d) Does this represent a linear or exponential model? Why?

3. The value of your antique watch is increasing at a rate of 4% per year.

a) If your watch is worth \$1,500 now, how much will it be worth in 20 years?

b) What would it be worth in 20 years if it increases \$50 in value per year?

4. Urban encroachment is causing the area of a forest to decline at a rate of 8.5% per year.

What is the half-life of the forest? Please include units in your answer.

- a) Use the approximation formula
- b) Use the exact formula.

5. Assume that for the average individual, aspirin has a half-life of 12 hours in the bloodstream. At 11 am, you take 300 milligram dose of aspirin.

a) How much aspirin will be in your blood at 6 pm (the same day)?

b) How much aspirin will you have in your bloodstream 2 days after taking the initial dose?

c) When will the amount of aspirin decay to 15% of its original amount?

6. The population of town XY was 25,000 in 1985, and 67,000 in 2005.

a) Find the growth rate?

b) What year will the population reach 80,000?

c) Predict the population of this town for the year 2020.

ANSWERS:

| 1.a) 15.85 years | 2.a) 8.497 months | 3. a) \$ 3,286.68 |
|------------------|---|-------------------|
| b) 15.15 years | b) 2,829 rabbits | b) \$ 2,500 |
| c) 7% per year | c) 31.75 months | |
| d) 6.7% per year | d) exponential (the growth is represented | |
| | as % change per monthy | |

4. a) 8.24 years b) 7.8 years 5. a) 200.23 mg b) 18.75 mg c) 32.84 mg 6. a) 5.05% b) 23.61 years c) 140,217