Semester 1 Review – Part 3: Exponential Functions. You may use calculators on these problems

1. A population of bacteria is growing at the rate of 15% per hour. There are currently 500 spores of this bacteria in the sample.

a) Create an equation that gives the population for this bacteria at any time t (t is in hours).

b) How any bacteria will there be in 10 hours?

c) How long will it take for the size of the population to double? Give your answer to the nearest hour.

2. Initially a tank contains 10,000 litres of liquid. At the time *t* = 0 minutes a tap is opened, and liquid then flows out of the tank. The volume of liquid, *V* litres, which remains in the tank after *t* minutes is given by:

$$V = 10000 \cdot (0.933)^t$$

(a) What percent of the liquid is flowing out each minute?

(b) Find the value of *V* after 5 minutes.

(1)

(c) Find how long, to the nearest tenth of a minute, it takes for half of the initial amount of liquid to flow out of the tank.

(3)

(d) The tank is regarded as effectively empty when 95% of the liquid has flowed out. Show that it takes almost three-quarters of an hour for this to happen.

3. Rewrite in simplest rational form. Your final answer should not have any exponents.

a. $\sqrt[3]{125^2} =$ b. $32^{-4/5} =$

4. Write in the form a^x where a is a prime number and x is a rational number.

$$16 \cdot 2^{\frac{3}{5}} =$$

5. Ella just put $500 into a bank account that promises to pay 3.0% annual interest, compounded monthly.

a) Create a formula that will give the amount of money, M(t), that Ella will have for any month (t). Make sure you reflect the monthly compounding.

b) How much money will Ella have saved up in three years if she leaves her money in this bank account?

c) When will she have enough to buy the new iPhone that costs $1,100?

6. Use the functions $f(x) = 3x - 5 \; and \; g(x) = 4 \cdot e^x$ to answer the questions below:

a) Describe the asymptotes of the function g(x).

b) Determine the composite function $(f \circ g)(x)$

c) Calculate $(f \circ g)(-2)$

d) Describe the asymptotes of the function $(f \circ g)(x)$.