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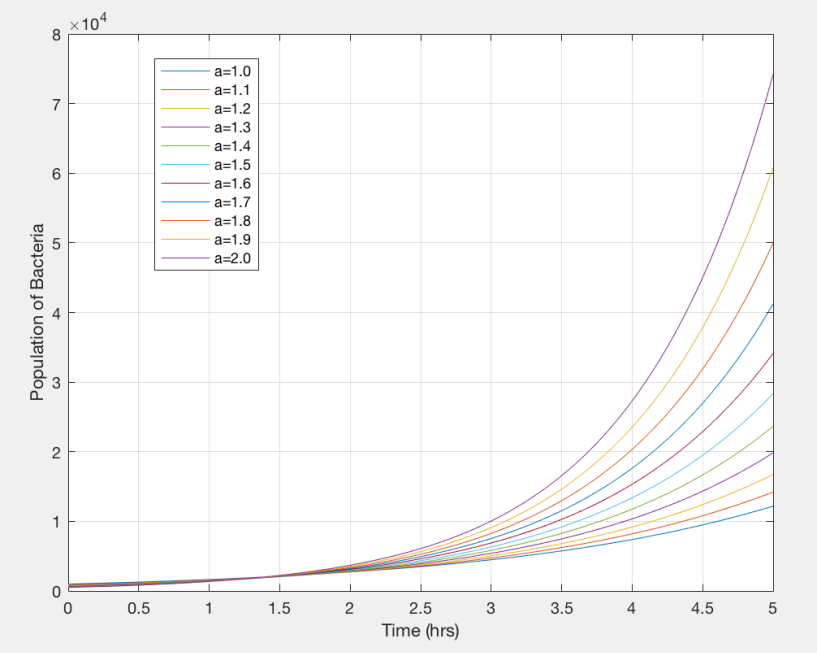
Expression	Result
A./B	3 1 3 0.5 1 0.5 1 1.333 0.333
A.*B	3 1 3 2 4 2 9 12 3
A.^2	9 1 9 1 4 1 9 16 1
rank (A)	3
rank (B)	1

```
t= linspace (0,5,101);

figure;

for a = 1:0.1:2
    p = (1000/a) * exp(0.5*a*t);
    plot(t,p);
    hold on;

end

hold all;
grid on;

xlabel('Time (hrs)');
ylabel('Population of Bacteria');
legend('a=1.0','a=1.1','a=1.2','a=1.3','a=1.4','a=1.5','a=1.6','a=1.7','a=1.8','a=1.9','a=2.0')
```



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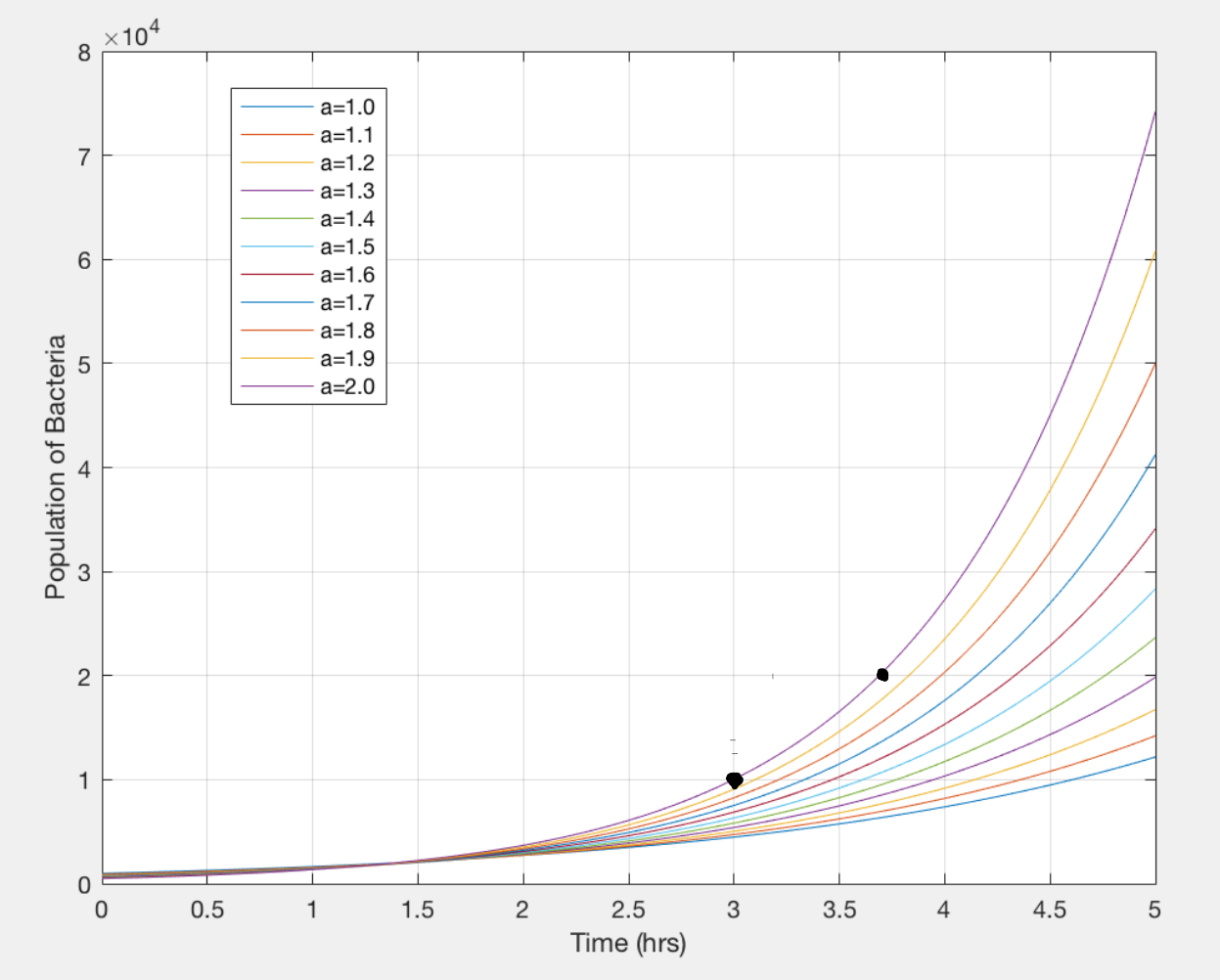
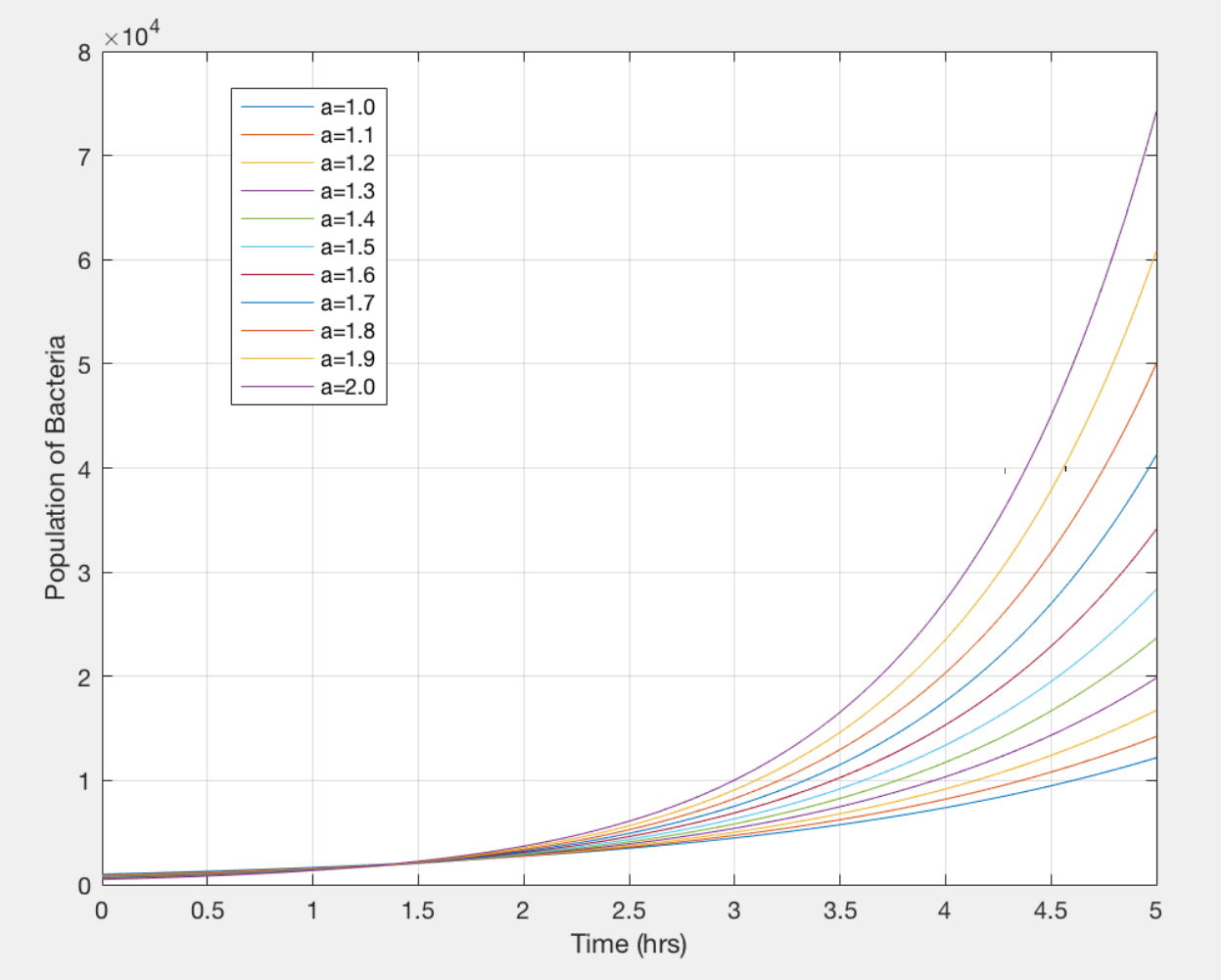
1. The highest value of ‘a’, which is 2.0, portrays the fastest growing exponential function. As the ‘a’ value increases, so does the rate at which the exponential grows and vice versa.

2. As t approaches infinity, the graph that contains the ‘a’ value 2.0 grows the fastest since the doubling time increases as the value of ‘a’ goes up. At t=5 the bacteria population is the highest in the graph of a =2.0 (if we restrict the domain from 0 hours to 5 hours). If the domain was all real numbers, the graph of a = 2.0 would still grow the fastest since it produces the largest exponent value.

3.



$$Doubling\ time = 3.75 - 3$$
$$= 0.75 \text{ hours}$$



$$Doubling\ Time = 4.4 - 3.75$$
$$= 0.65$$

The average of these 2 doubling times is 0.7 hours.

4. A similarity between doing matrix math by hand and doing matrix math via MatLab is that in both you need to initially set up an original matrix so that an operation could be performed on it. To begin performing an operation on a matrix, one needs to have a matrix already in place, so whether its on paper or on MatLab, there needs to be a matrix initially declared.

A difference between the two is that on paper, someone is more likely to make mistakes due to computational errors. However on MatLab, the algorithm solves the entire matrix operation without any errors (assuming you did not write the wrong code down). Another difference is that on paper you would have to use a single matrix to do several problems and it can become a bit tedious, whereas on MatLab you can just declare it once and keep using that matrix with the assigned variable you gave it.

The MatLab option would be more appropriate for large scale projects that would require many calculations. This is because during large scale projects, doing calculations that involve the same variables can become a long process if it were to be done on paper. In addition, during large

projects, if a mistake is found in the code of MatLab, it can be fixed easily therefore not jeapodizing the time invested, whereas if you make a mistake on paper, you would need to go back and change everything.

An engineer should consider to use a forloop when several same operations need to be done (like in this lab). A foreloop can make your code look very neat and clean while also saving the time of the coder.