MATH 1311

Final Exam Review

An exponential function can be used to model the number of bacteria in a petri dish.
The function: b(s, r, t) would represent the number of bacteria in the dish after t minutes have elapsed, with an initial value of s and a growth rate of r. Describe what b(1500, 0.04, 8) would represent.

The table below shows the number of trees in a forest, where t is measured in years from 1985 and N(t) is measured in thousands of trees.

t	0	5	10	15	20	25
N(t)	180	162	145.8	131.22	118.098	106.2882

Find the average rate of change between t = 5 and t = 10.

Use this to estimate the value for t = 6.

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t	0	5	10	15	20	25
N(t)	180	162	145.8	131.22	118.098	106.2882

Does this table of values represent a linear function, an exponential function, or neither.

Find the function, N(t), if it either linear or exponential.

To book a catering hall, a company charges $250 per room rented and $1.50 per guest.

Write a function that will represent this situation.

To book a catering hall, a company charges $250 per room rented and $1.50 per guest.

Determine the cost of renting 3 rooms for an event that will have 200 guests.

Consider the function: $f(x) = 2^{x+3} - 7$

What is the initial value of the function?

Consider the function: $f(x) = 2^{x+3} - 7$

What is the limiting value (if it exists) of the function?

Solve the following for x: $5x + b = c$

Determine all solutions to the following:

$$\frac{3x+2}{x-1} = x$$

Solve the system of equations: $\begin{matrix} 4x + y = 2 \\ y = 5 - x \end{matrix}$

A ball thrown into the air has the following heights for specific t-values during its flight.

t	0	2	5	8	12
h(t)	5	341	605	581	101

- Determine the quadratic regression of the path of the ball.

A ball thrown into the air has the following heights for specific t-values during its flight.

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- Use the regression to determine the maximum height of the ball, and when it occurs.

A ball thrown into the air has the following heights for specific t-values during its flight.

t	0	2	5	8	12
h(t)	5	341	605	581	101

- Determine when the ball hits the ground.

The façade of a house has walls that are 15 feet in height, 40 feet apart from one another. The peak of the roof is exactly halfway between the walls. What is the slope of the roof? (Assume a positive slope.)

The amount of butterflies in a nature preserve is increasing by 2% every month.

- By what percent will it increase by the end of the year?

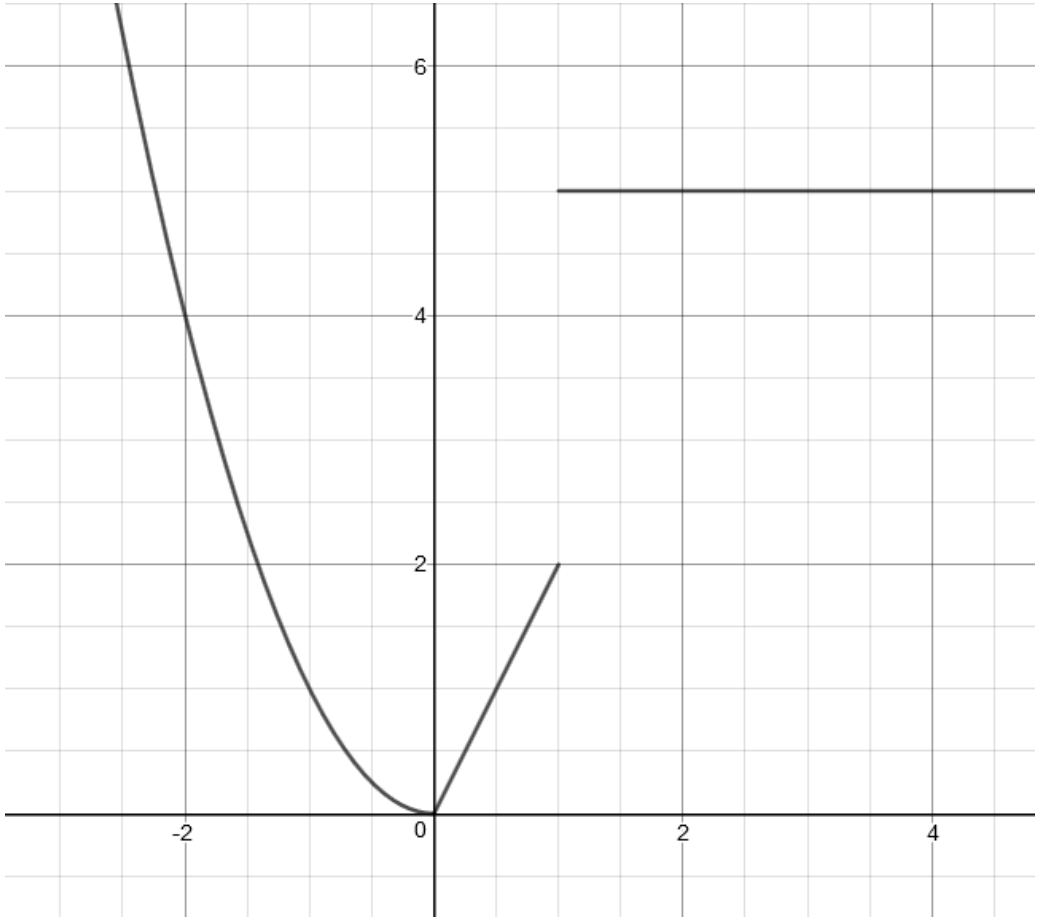
The amount of butterflies in a nature preserve is increasing by 2% every month.

- How many months will it take for the butterfly population to reach double its original amount?

Find the rate of change for $y = 3^x$ at the value of $x = 2$. Use a interval of 1.

If $^{df}/_{dx}$ is evaluates to -2 when x = 3, what can you say about f(x) when x = 3?

The following graph shows f(x). Describe the value of $^{df}/_{dx}$ when x = 3.



Determine the value of $f(g(x))$ and $g(f(x))$ for the functions: $f(x) = 5x - 3$ and $g(x) = 2x + 5$

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- Determine the values of f(g(8)) and g(f(8)).

A function has $^{df}/_{dx} = -2f(x)$ where f has an initial condition of 4. Determine its equation.

Determine relative minimum value of:

$$f(x) = \frac{x^2 + 2x + 1}{x - 3}$$

Are the following polynomial? If so, give the degree.

- $f(x) = 5x^3 + 4x^2 – 2x + 1$
- $g(x) = 3x + 5$
- $h(x) = 4^x$
- $i(x) = x^{½} + 3x^3$
- $j(x) = 4/x$
- $k(x) = -8x^3 + 5x^6 – 11x^7$

Construct a power function of the form: $f(x) = a\,x^k$, where $f(2) = 40$ and $f(4) = 320$.

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Find the value of $f(8)$.

Model the following data with a logarithmic function:

x	1	2	3	4	5
f(x)	0	2	3.17	4	4.64386

Use this function to determine the value of f(10).

A logistic function has an initial value of 15, a limiting value of 35, and (assuming lack of constraints) a constant growth rate of 2%. Determine its equation.

Keep in mind: $b = {}^{K}/_{N(0)} - 1$ and $r = \ln(\text{growth factor})$.

A logistic function has an initial value of 14, a limiting value of 38, and (assuming lack of constraints) a constant growth rate of 2%. Determine its equation.

Determine when and for what value the function will obtain it maximum growth yield.

A line has a slope of 12 and passes through the point (4,5) and (k, 197). Determine the value of k.