**Mathematics 3201**

**Unit 6: Exponential Functions**

**Unit Assessment**

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Section 1: Selected Response (32 points)**

 **Circle the letter of the correct answer.**

1. Which represents an increasing function?

|  |  |  |  |
| --- | --- | --- | --- |
| A) f(x) = $\frac{1}{3}\left(\frac{4}{5}\right)^{x}$ | B) f(x) = $2\left(\frac{2}{3}\right)^{x}$ | C) f(x) = 2(1)x | D) f(x) = $\frac{1}{2}\left(3\right)^{x}$ |

2. What is the y-intercept of: f(x) = 5(2)x?

|  |  |  |  |
| --- | --- | --- | --- |
| A) (0, 2) | B) (0, 5) | C) (0, 10) | D) (0, 0) |

3. Which exponential function represents the graph shown?

|  |  |  |
| --- | --- | --- |
| A) $f\left(x\right)=4\left(2\right)^{x}$ | C) $f\left(x\right)=2\left(4\right)^{x}$ |  |
| B) $f\left(x\right)=4\left(\frac{1}{2}\right)^{x}$ | D)$f\left(x\right)=3\left(\frac{1}{2}\right)^{x}$ |

4. What is the range of f(x) = 4(3)x ?

|  |  |  |  |
| --- | --- | --- | --- |
| A) $y>4$ | B) $y\geq 4$ | C) $y >0$ | D) $y\geq 0$ |

5. What is the domain of f(x) = $\frac{1}{2}\left(\frac{3}{4}\right)^{x}$?

|  |  |  |  |
| --- | --- | --- | --- |
| A) $x\geq \frac{1}{2}$ | B) $x\in R$ | C) $x>\frac{3}{4}$ | D) $x>0$ |

6. What is the exponential function for the data given:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | -1 | 0 | 1 | 2 | 3 |
| f(x) | 81 | 27 | 9 | 3 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| A) $f\left(x\right)=27\left(\frac{1}{3}\right)^{x}$ | B) $f\left(x\right)=81\left(\frac{1}{3}\right)^{x}$ | C) $f\left(x\right)=27\left(3\right)^{x}$ | D) $f\left(x\right)=81\left(3\right)^{x}$ |

7. Solve for x: 52x+1 = 1253x

|  |  |  |  |
| --- | --- | --- | --- |
| A) $\frac{1}{8}$ | B) $\frac{1}{7}$ | C)$ \frac{1}{4}$ | D) 7 |

8. Solve for x: 23x = $\sqrt{4}^{x+1}$

|  |  |  |  |
| --- | --- | --- | --- |
| A) $ \frac{1}{4}$ | B) $ \frac{ 1}{2}$ | C) 1 | D) 2 |

9. What is the value of x if f(x) in the equation $81=3^{-3(x+2)}$

|  |  |  |  |
| --- | --- | --- | --- |
| A) $ \frac{-10}{3}$ | B) $ \frac{-2}{3}$ | C) $ \frac{3}{5}$ | D) 3 |

10. What is the true of the table given below?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x(years) | 0 | 2 | 4 | 6 | 8 |
| y(amount) | 10 | 30 | 90 | 270 | 810 |

|  |  |  |
| --- | --- | --- |
|  | Initial Amount | Amount Growth |
|  A) | 10 | doubles every three years |
|  B) | 10 | triples every two years |
|  C) | 20 | doubles every three years |
|  D) | 20 | triples every two years |

11. The function that models the decay of carbon-14 is$ A\left(t\right)=50\left(\frac{1}{2}\right)^{\frac{t}{5730}}$ where *A*(*t*) is the number of grams of carbon-14 present at time *t*, in years. Which statement is true?

A) The amount of carbon-14 doubles every 5730 years.

B) There are 100 g of carbon-14 present initially.

C) 25 g will be present after 50 years.

D) 25 g of carbon-14 will be present after 5730 years.

12. A = 1000(1.09)4 represents a bank loan that is compound annually. What is the interest rate?

|  |  |  |  |
| --- | --- | --- | --- |
| A) 1000% | B) 9% | C) 81% | D) 4% |

13. Rick’s car valued at $22,600 depreciates in value by 16% per year. Which equation represents the car’s value after 5 years?

|  |  |  |  |
| --- | --- | --- | --- |
| A) $V=22600\left(1.16\right)^{5}$ | B) $ V=22600\left(0.16\right)^{5}$ | C) $ V=22600\left(0.84\right)^{5}$ | D) $ V=22600\left(1.84\right)^{5}$ |

14. Joel invested $5000 in a savings account that pays 6%/a compounded quarterly. Which equation represents how much money Joel has after 6 years?

|  |  |  |  |
| --- | --- | --- | --- |
| A) $V=5000\left(1.05\right)^{6}$ | B) $ V=5000\left(1.025\right)^{6}$ | C) $ V=5000\left(1.0125\right)^{6}$ | D) $ V=5000\left(1.004\right)^{6}$ |

15. The following data shows exponential growth. Determine the missing value in the given table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| *y* | 3 | 6 | 12 | 24 | 48 | x | 192 | 384 |

|  |  |  |  |
| --- | --- | --- | --- |
| A) 72 | B) 96 | C) 104 | D) 144 |

16. A scatter plot is drawn using a data set. Identify the equation of the

curve of best fit.

|  |  |  |
| --- | --- | --- |
| A) f(x)= 4.8(1.08)x | C) f(x) = 8.4(0.81)x |  |
| B) f(x) = 4.8(0.81)x | D) f(x) = 8.4(1.08)x |

**Section 2: Constructed Response (40 points)**

 **Answer all the questions showing all your work.**

1. Complete the table below: (12 points)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Characteristics | f(x) = 5x | f(x) = 3(2)x | $$f\left(x\right)= \left(\frac{1}{2}\right)^{x}$$ | $$f\left(x\right)=4\left(\frac{1}{3}\right)^{x}$$ |
| Number of x-intercepts |  |  |  |  |
| y-intercept |  |  |  |  |
| End Behaviour |  |  |  |  |
| Domain |  |  |  |  |
| Range |  |  |  |  |
| Increasing or Decreasing |  |  |  |  |

2. For the following graph determine: (6 points)

 A) y-intercept - \_\_\_\_\_\_\_

 B) the end behaviour - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 C) the domain - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 D) the range - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 E) Increasing or Decreasing Function - \_\_\_\_\_\_\_\_\_

 F) Is the parameter “b” in the equation of the function greater than 1 or between 0 and 1? Provide your reasoning.

3. Solve each exponential equation. (12 marks)

|  |  |
| --- | --- |
| A) 2(3)x = 54 | B) $2^{x+1}=\sqrt{32}$ |
| C) $25^{\left(x-3\right)}=\frac{1}{125}$ | D) $2\left(\frac{1}{3}\right)^{2x}=18$ |

4. Joanne invested $5000 in a savings account that pays 7% per year compounded quarterly.

 A) Write an equation to represent the above situation. (3 points)

 B) How much money will Joanne have after 2 years? (2 points)

5. Samuel’s car currently valued at $32000, depreciates in value by 18% per year.

 A) Write an equation to represent the above situation. (3 points)

 B) What will the car be worth in 4 years? (2 points)