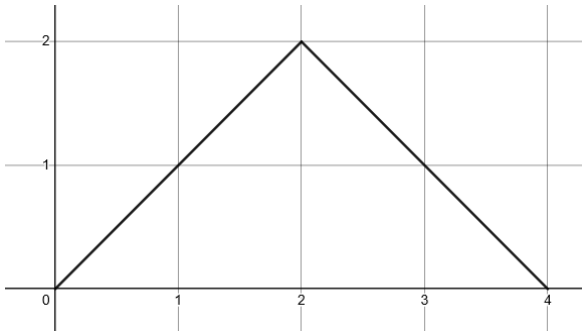
Part 4. Math Practice Test – Functions and Graphs

This practice test is based off the Alexander College Math Placement Test Study Guide, but is not comprehensive of that study guide. The study guide can be found at https://alexandercollege.ca/admissions-and-registration/placement-testing/. It is highly encouraged you read through the study guide in addition to this test.

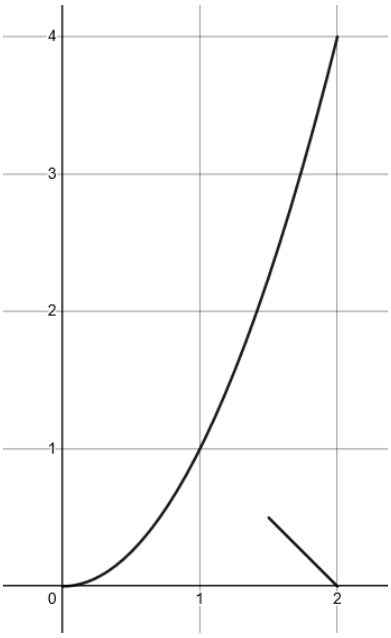
Do not use a calculator

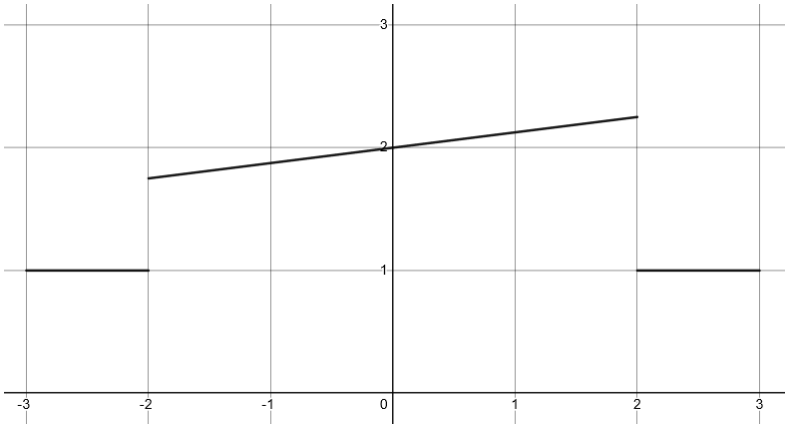
1) Determine if the graph shown is a function:

a.



b.



c. 

2) Determine the domain and range of the following functions:

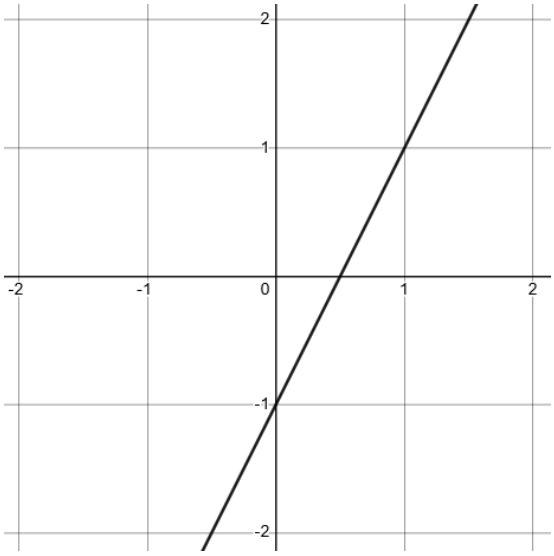
a. $\mathrm{y} = \sin(x)$

b. $y = x^2 + 1$

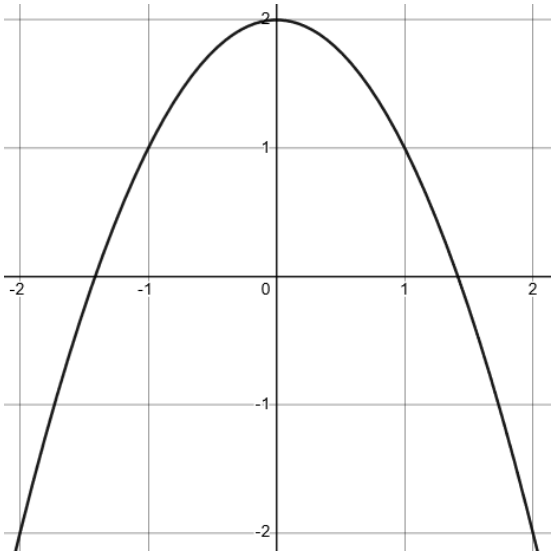
c. $y = \frac{x^2-1}{x-1}$

3) From the graph, write the function.

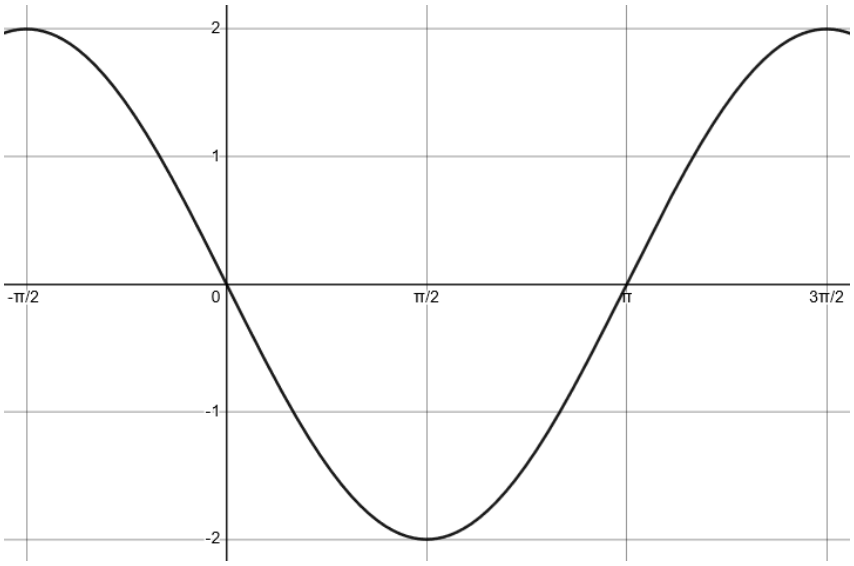
a.



b.



c.



4) Resolve the function compositions below:

a. $f(x) = x^2$ and $g(x) = x + 1$. Find $f(g(x))$.

b. $f(x) = \sin(x)$ and $g(x) = 3^x$. Find $(f \circ g)(x)$.

c. $f(x) = x^2$ and $g(x) = 3^x$. Find $(g \circ f)(x)$.

5) Determine the intervals where the function is increasing, decreasing, or constant.

   a. $f(x) = 3x + 1$

   b. $g(x) = x^2$

   c. $h(x) = e^x$

6) Identify the functions below as odd, even, or neither.

   a. $\sin(x)$

   b. x^2

   c. $x^3 + 4$

   d. x^5

7) Graph the functions below:

a. $f(x) = 2e^x$

b. $g(x) = \ln(x)$

c. $h(x) = x^2 + 4x + 3$

8) Solve the problems below:

a. Find the inverse function of $f(x) = -2x$

b. Find the inverse function of $y = \ln(x)$

c. For $f(x) = \ln(3x)$ and $g(x) = \frac{1}{3}e^x$, find $(f \circ g)(x)$

9) Graph the functions below:

a. $f(x) = 3(x-2)^2 + 1$

b. $f(x) = \frac{1}{2}\sin(x-\pi)$

c. $f(x) = \frac{1}{2}\ln(e^{x^2})$

10) Use properties of exponents and logarithms to simplify the following:

a. $(e^x)^2$

b. $\ln(e * x^2)$

c. $\ln\left(\frac{3^2 3^3}{e^x}\right)$

11) Solve the following equations for x:

a. $3^x = 27$

b. $9e^x = 1$

c. $6^x = 92$

12) Solve the following problems:

a. A loan has an interest rate of 43% per year. If the initial amount loaned out is \$100, but much will be owed at the end of the year?

For help: https://youtu.be/GtaoP0skPWc

b. A bank account earns 2% interest per year of investment. How many years will it take to save $200 if $100 is put in as an initial balance, and nothing is taken out.

c. A scientist wants to examine population growth of bacteria. At $t = 0$ they put 100 bacteria into a petri dish. After 10 hours, they count 500 bacteria. What is the growth constant of the bacteria? For help: https://youtu.be/KyAKEisg2PQ