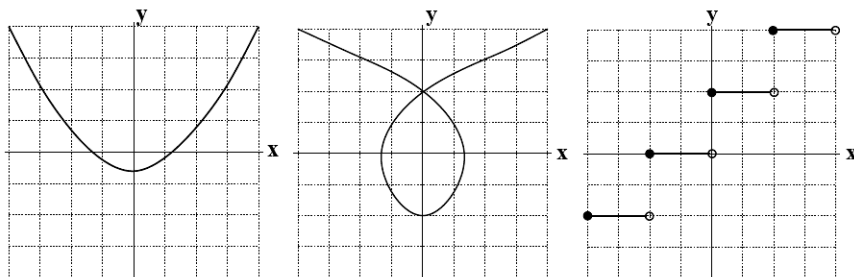


**Part I: Math Concepts**

1) Can you determine what a graph of a function should look like?



2) True or false:

a) If  $f(x) = 10$  then  $f(2) = 20$ .

b) If  $f(1) = 10$  then  $f(2) = 20$ .

3) If  $f(t) = kt^2 + 4t$  find  $f(2)$ .

4) If  $m(t) = t^2 - 16$  find  $m(t) = 0$ .

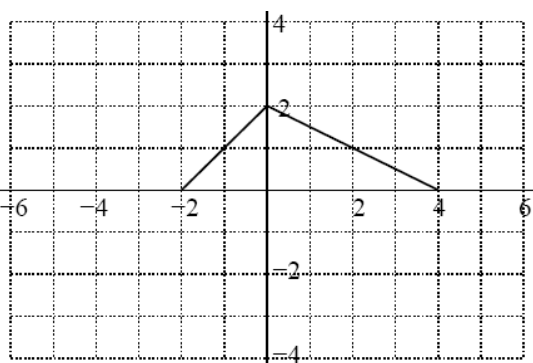
5) What is the domain and range of

a)  $f(x) = \frac{5}{x}$

b)  $y = \sqrt{3x} + 5$

c)  $y = x^3 + x$

6) Let  $y = f(x)$  be the function whose graph is given below. Fill in the entries in the table below, and then sketch a graph of the transformations  $y = 2f(x)$  and  $y = f(x - 2)$ .



|            |    |    |   |   |   |   |
|------------|----|----|---|---|---|---|
| $x$        | -4 | -2 | 0 | 2 | 4 | 6 |
| $f(x)$     |    |    |   |   |   |   |
| $2f(x)$    |    |    |   |   |   |   |
| $f(x - 2)$ |    |    |   |   |   |   |

7) If  $g(t) = f(t + 1) - 6$  then the graph of  $g(t)$  is the graph of  $f(t)$  shifted...

8) Know what the graphs of  $y = \frac{1}{2}f(x)$ ,  $y = f(2x)$ ,  $y = 2f(x)$ , and  $y = f(\frac{1}{2}x)$  look like.

**Part II: Engineering Concepts**

9) The first digital computer was...

10) Who and when invented the Integrated Circuit?

11) What is a transistor?

12) Compare and contrast analog vs. digital.

13) What are the steps in the engineering design process?

14) Moore's law predicts...

15) What is bit short for?

16) Convert 29 to binary form.

17) Convert  $10111_2$  to decimal form.

18) On Monkey Island, there were 200 monkeys. If the population doubles every 3 years, how many monkeys would there be after 15 years?

20) Convert 2000 bytes into bits.

21) Estimate the # of Martians required in order to circumnavigate Mars at the equator if they were all to hold hands. ( $D_M = 6787\text{km}$ . The average Martian arm span is 3 ft.  $5280\text{ft} = 1\text{mile}$ ;  $1\text{ft} = 0.3\text{m}$ )

22) If the number of brain cells you had followed Moore's Law and you started with 2000 brain cells, how many brain cells would you have at age 15?

23) Build the block diagram for the slope formula:  $m = (y_2 - y_1) / (x_2 - x_1)$