**Unit 3 #4 EVALUATING PIECEWISE & STEP FUNCTIONS**

**What is a Piecewise Function?**

A **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  function is a function that is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of one or more functions. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_for a piecewise function is different for different parts, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, of the domain.

For instance, movie ticket prices are often different for different age groups. So the function for movie ticket prices would assign a different value (ticket price) for each domain interval (age group).

**Writing the Intervals of a Piecewise Function**

Write the domain of the following table

**Remember:**

When using \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, square brackets [ ] indicate an included \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and parentheses
( ) indicate an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ endpoint.

|  |  |
| --- | --- |
| Green Fee ($) | Time Range (h) |
| 28 | 8 A.M. – noon |
| 24 | noon – 4 P.M. |
| 12 | 4 P.M. – 9 P.M. |

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**What do Piecewise Functions look like?**

f(x) = x2 + 1, x < 0 You can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ piecewise functions.

x – 1, x > 0 You can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_piecewise functions.

**Evaluating Piecewise Functions:** Evaluating piecewise functions is just like evaluating functions that you are already familiar with.

Example 1. f(x) = x2 + 1, x < 0 Example 2. f(x) = x2 + 1, x < 0

 x – 1, x > 0 x – 1, x > 0

Let’s calculate f(2). Let’s calculate f(-2).

You are being asked to find y when x = 2. Since 2 You are being asked to find y when x = -2. Since -2 is < 0,

is ≥ 0, you will only substitute into the second you will only substitute into the first part of the function.

part of the function.

**PRACTICE PROBLEMS**

3. f(x) = 2x + 1, x < 0 4. f(x) = 3x – 2, x < -2

 2x + 2, x > 0 -x, -2 ≤ x < 1 x2 – 7x, x ≥ 1

f(-2)= f(5)= f(-2)= f(-4)=

f(0)= f(1)= f(3)= f(1)=

**Writing Piecewise Functions**

 Your favorite dog groomer charges according to your dog’s weight.  If your dog is 15 pounds and under, the groomer charges $35.  If your dog is between 15 and 40 pounds, she charges $40.  If your dog is over 40 pounds, she charges $40, plus an additional $2 for each pound.

1. What would the groomer charge if your cute dog weighs 60 pounds? How can we represent this data as a piecewise function?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, if 0 < x < 15

f(x) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, if 15 < x < 40 Now, how much would the dog groomer charge for your 60lb dog?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, x > 40

**WHITEBOARD PRACTICE** *Be sure to number your problem on your whiteboard when you hold up your answer!*

1.  a. f(7) b. f(-1) c. f(-3)
 2.  a. f(10) b. f(-2) c. f(-5)
3.  a. f(0) b. f(-2) c. f(2)
4.  a. f(-2) b. f(0) c. f(5)

5. **(APPLICATION PROBLEM)** When a diabetic takes long-acting insulin, the insulin reaches its peak effect on the blood sugar level in about three hours. This effect remains fairly constant for 5 hours, then declines, and is very low until the next injection. In a typical patient, the level of insulin might be modeled by the following function.



Here, represents the blood sugar level at time *t* hours after the time of the injection. If a patient takes insulin at 6 am, find the blood sugar level at each of the following times.

 a. 7 am b. 11 am c. 3 pm d. 5 pm