**Activity 6.3.2 Graph the Big Three**

Now we will graph the sine function by making a table of values and plotting points.

1. Make a table of values for **f(t) = sin(t)**
2. Plot the points carefully on a separate sheet of graph paper (use “landscape” orientation)
3. Connect the points to make a continuous curve.
4. Sketch a final copy of the graph of f(t) = sin(t) at the bottom of this page. Sketch two periods of the function from t = - 2π to t = 2π. Label the t-axis every $\frac{π}{2}$ ( 90°) .

|  |  |  |  |
| --- | --- | --- | --- |
| t radians | t degrees | sin(t) exact | sin(t) decimal approx. |
|  0  |  |  |  |
| $$ \frac{π}{6}$$ |  |  |  |
| $$ \frac{π}{4}$$ |  |  |  |
| $$\frac{π}{3}$$ |  |  |  |
| $$\frac{π}{2}$$ |  |  |  |
| $$\frac{2π}{3}$$ |  |  |  |
| $$\frac{3π}{4}$$ |  |  |  |
| $$\frac{5π}{6}$$ |  |  |  |
|  π |  |  |  |
| $$\frac{3π}{2}$$ |  |  |  |
|  2π |  |  |  |

f(t) = sin(t)

Now do the same for cos(t) as you did for sin(t):

1. Make a table of values for **f(t) = cos(t)**
2. Plot the points carefully on a separate sheet of graph paper (use “landscape” orientation)
3. Connect the points to make a continuous curve.
4. Sketch a final copy of the graph of f(t) = cos(t) at the bottom of this page. Sketch two periods of the function from t= - 2π to t= 2π. Label the t-axis every $\frac{π}{2}$ ( 90°) .

|  |  |  |  |
| --- | --- | --- | --- |
| t radians | t degrees | cos(t) exact | cos(t) decimal approx. |
|  0  |  |  |  |
| $$ \frac{π}{6}$$ |  |  |  |
| $$ \frac{π}{4}$$ |  |  |  |
| $$\frac{π}{3}$$ |  |  |  |
| $$\frac{π}{2}$$ |  |  |  |
| $$\frac{2π}{3}$$ |  |  |  |
| $$\frac{3π}{4}$$ |  |  |  |
| $$\frac{5π}{6}$$ |  |  |  |
|  π |  |  |  |
| $$\frac{3π}{2}$$ |  |  |  |
|  2π |  |  |  |

f(t) = cos(t)

The last of the Big Three is the graph of the function f(t) = tan(t)

1. Make a table of values for **f(t) = tan(t)**
2. Plot the points carefully on a separate sheet of graph paper (use “landscape” orientation)
3. Connect the points to make a continuous curve.
4. Sketch a final copy of the graph of f(t)=sin(t) at the bottom of this page. Sketch two periods of the function from t = - π to t = π. Label the t-axis every $\frac{π}{2}$ ( 90°).

|  |  |  |  |
| --- | --- | --- | --- |
| t radians | t degrees | tan(t) exact | tan(t) decimal approx. |
|  0  |  |  |  |
| $$ \frac{π}{6}$$ |  |  |  |
| $$ \frac{π}{4}$$ |  |  |  |
| $$\frac{π}{3}$$ |  |  |  |
| $$\frac{π}{2}$$ |  |  |  |
| $$\frac{2π}{3}$$ |  |  |  |
| $$\frac{3π}{4}$$ |  |  |  |
| $$\frac{5π}{6}$$ |  |  |  |
|  π |  |  |  |
| $$\frac{3π}{2}$$ |  |  |  |
|  2π |  |  |  |

f(t) = tan(t)

**Check your understanding:**

1. What is the period for each of the three trigonometric functions? (Answer in radians and degrees)?

1. The period of the sine function is \_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_
2. The period of the cosine function is \_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_
3. The period of the tangent function is \_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_
4. Maximum values, minimum values, and end behavior
5. The maximum value that sin(t) or cos(t) can be is \_\_\_\_\_\_.
6. The minimum value that sin(t) or cos(t) can be is \_\_\_\_\_.
7. The equation of the midline of the graphs for the sine and cosine functions is \_\_\_\_\_ .
8. Describe the behavior of the graph of y = tan(t) over the interval ($\frac{-π}{2},\frac{π}{2})$:

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Amplitude of graphs
	1. The amplitude for the graphs of the functions f(t) = sin(t) and f(t) = cos(t) is \_\_\_\_\_\_.
	2. Why doesn’t the tangent function have an amplitude? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. The equations of some vertical asymptotes for the graph of the tangent function are (answer in radians and degrees):

t =\_\_\_\_\_, \_\_\_\_\_ , t = \_\_\_\_\_, \_\_\_\_\_\_ t =\_\_\_\_\_\_, \_\_\_\_\_\_, t =\_\_\_\_\_\_, \_\_\_\_\_\_

1. Answer the following with either *increasing* or *decreasing*.
	1. At the origin, the sine function is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	2. At the origin, the cosine function is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	3. At the origin, the tangent function is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	4. In fact, the tangent function is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ throughout its entire domain.
2. Function behavior:
3. For what values of t is the sine function increasing most rapidly?
4. For what values of t is the cosine function increasing most rapidly?
5. What horizontal shift could be applied to the cosine function to make it equivalent to the sine function?
6. Write an algebra equation that shifts cosine so that it equals sine. Fill in the blank below:

 cos \_\_\_\_\_\_ = sin(t).