BITL3 **Math Lab**

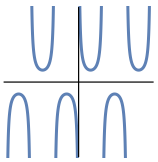
Worksheet 9

6 October 2021

1. **Warm up:** Answer the following questions with True or False.
   (a) If $x \in [1, \infty)$, then $n > m$ implies $x^n \geqslant x^m$, for $n, m \in \mathbf{N}$.
   (b) If $x \in [0, 1]$, then $n > m$ implies $x^n \geqslant x^m$, for $n, m \in \mathbf{N}$.
   (c) As x goes to ∞, the value of $f(x) = a^x$ also goes to ∞, for any positive $a \in \mathbf{R}$.
   (d) There exists some $b \in \mathbf{R}$ such that a^b never changes, for every positive $a \in \mathbf{R}$.

2. For each of the following functions, find their range (assuming the domain is $\mathbf{R}$) and inverse function. Or, state why the inverse does not exist.
   (a) $f(x) = 3x$
   (b) $g(x) = 5 - 9x$
   (c) $h(x) = x^2 + 2$
   (d) $k(x) = x^3 - 1$
   (e) $\ell(x) = 3e^{2x} - 10$

3. Identify the following graphs with the given trigonometric functions.

(a) 
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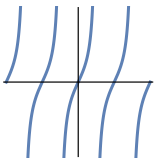
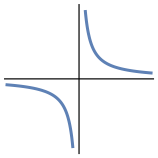
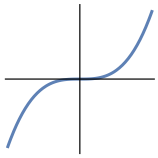
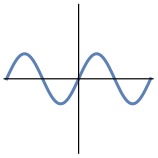
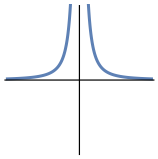
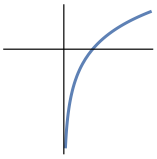
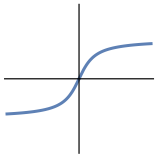
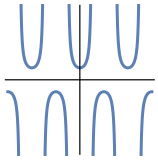
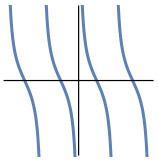
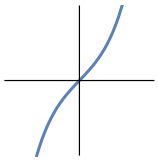
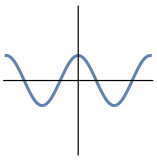
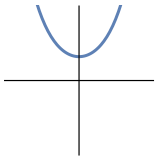
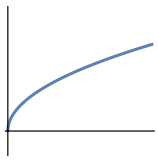
(g) 
(j) 
(m) 

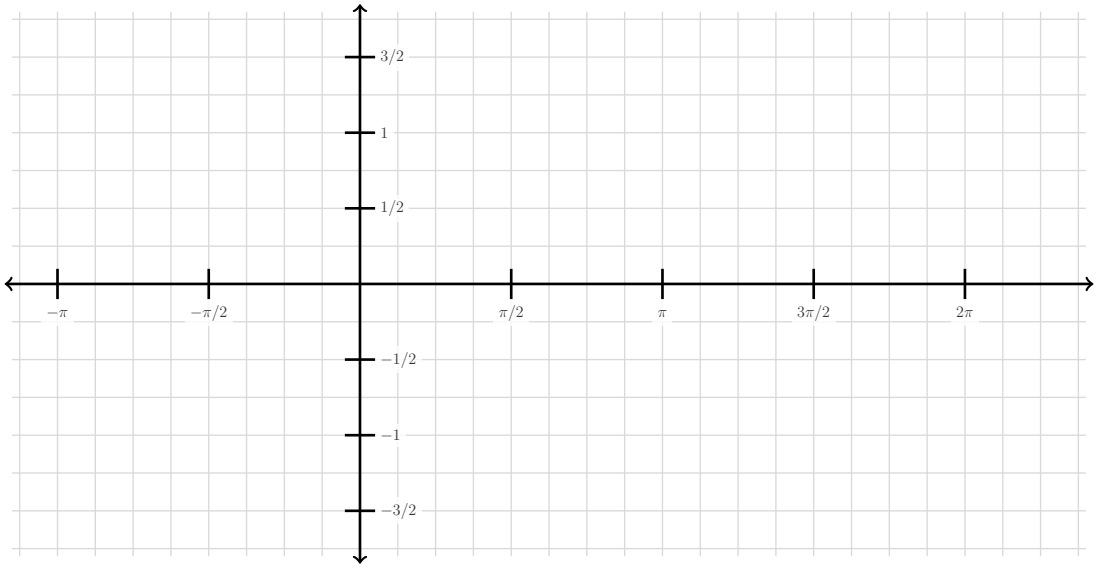
(b) 
(e) 
(h) 
(k) 
(n) 

(c) 
(f) 
(i) 
(l) 
(o) 

e^x	$\csc(x)$	$\cot(x)$	$\cos(x)$	x^3
$\sin(x)$	$\log(x)$	$\sqrt{x}$	$1/x^2$	$\sec(x)$
$\cosh(x)$	$\arctan(x)$	$1/x$	$\tan(x)$	$\sinh(x)$

4. Draw the graphs of the following functions.

$$\sin(x) \qquad \sin(x) + \frac{1}{2} \qquad \sin\left(x + \frac{\pi}{2}\right) \qquad \frac{3}{2} \cdot \sin(x) \qquad \frac{\sin(2x) + 1}{2} \qquad \cos\left(\frac{x}{2}\right)$$



5. Draw the graphs of the following functions.

$$\frac{1}{x} \qquad \frac{2}{x} \qquad \frac{1}{2x} + 2 \qquad \frac{1}{x+2} \qquad \frac{3-2x}{x-1}$$