

Spring 2025 Laird Homework 3 Solutions

1. FALSE - Exponential functions are not periodic
2. FALSE - Polynomial functions are not periodic
3. TRUE - Sine functions are periodic
4. FALSE - Rational functions of this form are not periodic
5. TRUE - Tangent functions are periodic

Question 6

- a) Period: 4 b) Frequency: $\frac{1}{4}$ c) Midline: $y = 1$ d) Amplitude: 2
 e) Function equation: $y = 2 \sin(\frac{\pi}{2}x) + 1$

Question 7

- a) Period: π b) Frequency: $\frac{1}{\pi}$ c) Midline: $y = -2$ d) Amplitude: 3
 e) Function equation: $y = -3 \cos(2x) - 2$

Question 8

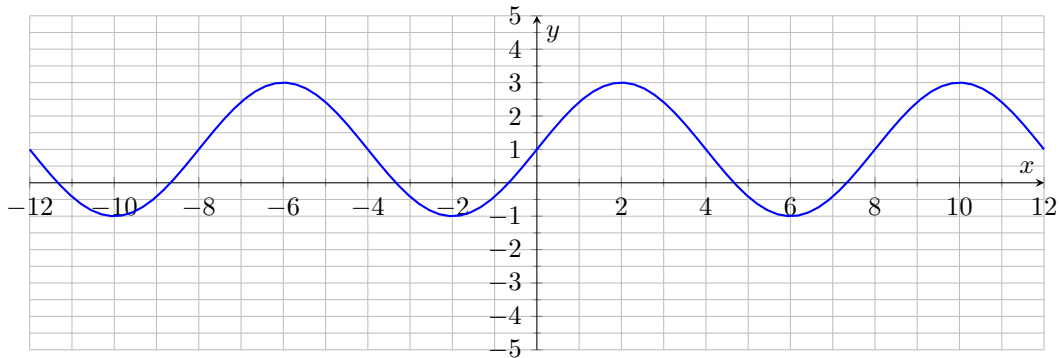
- a) Period: $\frac{2\pi}{3}$ b) Frequency: $\frac{3}{2\pi}$ c) Midline: $y = 0$ d) Amplitude: $\frac{1}{2}$
 e) Function equation: $y = \frac{1}{2} \sin(3x)$

Question 9

- a) Period: 6π b) Frequency: $\frac{1}{6\pi}$ c) Midline: $y = 3$ d) Amplitude: 4
 e) Function equation: $y = 4 \cos(\frac{x}{3}) + 3$

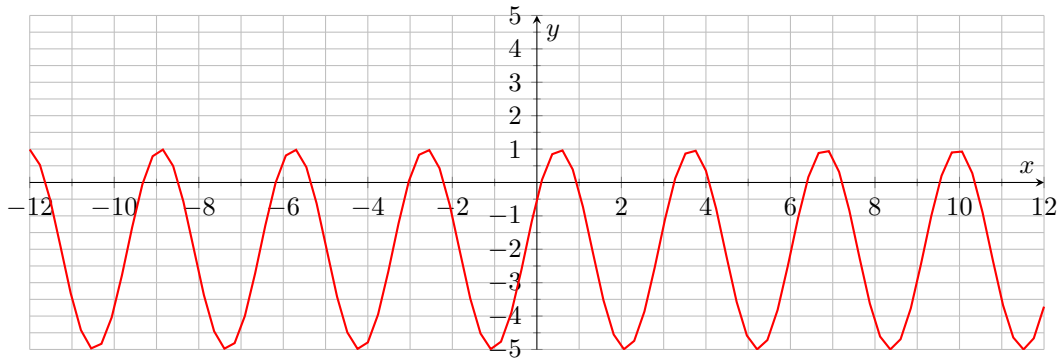
Question 10

$$y = -2 \sin(\frac{\pi}{4}x + \pi) + 1$$



Question 11

$$y = 3 \cos(2x - \frac{\pi}{3}) - 2$$



Question 12

Two points where $n(x)$ has relative maxima:

$$x = \frac{\pi}{6} + n\pi \text{ for integer values of } n$$

For example: $x = \frac{\pi}{6}$ and $x = \frac{2\pi}{3}$

Question 13

Transformations from $\cos(x)$ to $n(x) = 3 \cos(2x - \frac{\pi}{3}) - 2$:

1. Phase shift/Horizontal translation to the right by $\frac{\pi}{3}$
2. Horizontal dilation by a factor of $\frac{1}{2}$ (period changes from 2π to π)
3. Vertical dilation by a factor of 3 (amplitude changes from 1 to 3)
4. Vertical translation down by 2 units (midline changes from $y = 0$ to $y = -2$)