Key

A2CC - Unit 7 Review - Trig Graphs Review Sheet #2

___ 1. Write $y = x^2 - 5x + 2$ in vertex form.

$y - 2 = x^2 - 5x$

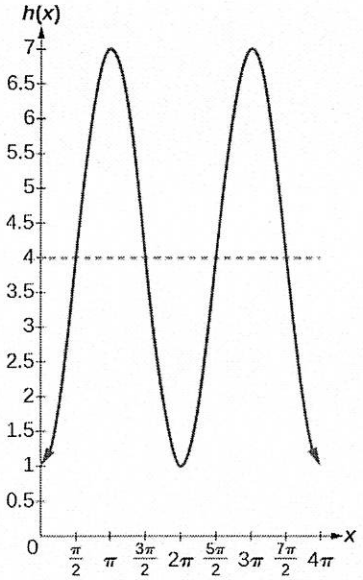
$y - 2 + \frac{25}{4} = x^2 - 5x + \frac{25}{4}$

$y + \frac{17}{4} = (x - \frac{5}{2})^2$

$y = (x - \frac{5}{2})^2 - \frac{17}{4}$

Vertex $(\frac{5}{2}, -\frac{17}{4})$

___ 2. What equation is represented by the graph below?



- cos

$a = \frac{1}{2}|7 - 1| = \frac{1}{2}(6) = 3$

$\text{freq} = b = \frac{2\pi}{\text{per}} = 1$

VS = midline $(y = 4)$ = + 4 up 4

$y = -3\cos 1x + 4$

2 + | $y = -5$ | - -

___ 3. Write a cosine function has a period of 4π a midline of y = -5 a maximum value of 2.

$y = 7\cos\frac{1}{2}x - 5$

$\text{amp} = \frac{1}{2}|2 - -12| = \frac{1}{2}(14) = 7$

$\text{freq} = \frac{2\pi}{\text{per}} = \frac{2\pi}{4\pi} = \frac{1}{2}$

$VS = -5$

___ 4. Express $y = -2\sin(x)$ as a function of $\cos(x)$.

Shift right $\pi/2$

$y = -2\cos(x - \pi/2)$

___ 5. Divide $f(x) = 2x^3 + x^2 - 4x + 4$ by $(x + 2)$.

$-2 \mid 2 \quad 1 \quad -4 \quad 4$

$\quad\quad\downarrow \quad -4 \quad 6 \quad -4$

$\quad\quad 2 \quad -3 \quad 2 \quad 0$

$\frac{2x^3 + x^2 - 4x + 4}{x + 2} = 2x^2 - 3x + 2$

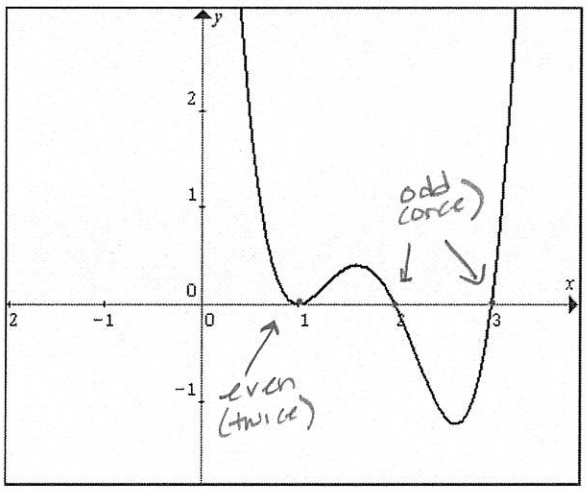
(2, −1, 1)

____ 6. Solve the following system of equations:

$$x - 2y + 3z = 7$$
$$2x + y + z = 4$$
$$-3x + 2y - 2z = -10$$

____ 7. Given the graph below, express the equation of this function, and explain your reasoning.

x=1 is an even root so it occurs twice!
x=2, x=3 are odd roots so they occur once.



$(x-1)(x-1)(x-2)(x-3)$

$(x-1)(x-1)(x-2)(x-3) = y$

$(x^2-2x+1)(x^2-5x+6) = y$

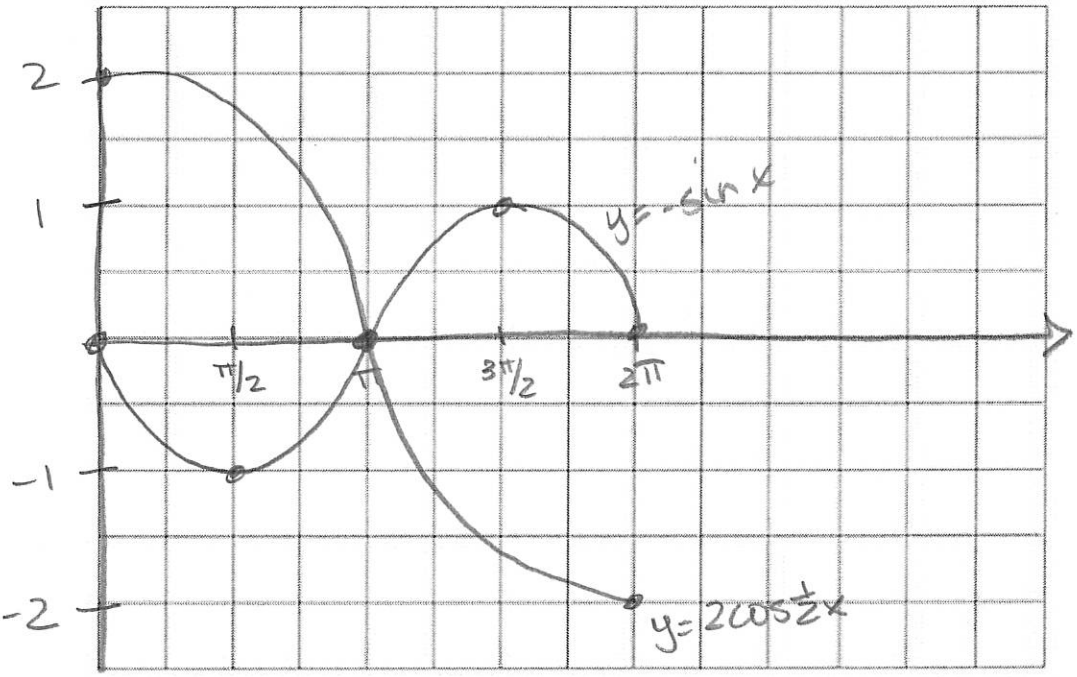
$y = x^4 - 7x^3 + 17x^2 - 17x + 6$

8.

a On the same set of axes, sketch the graphs of the equations $y = 2\cos\frac{1}{2}x$ and $y = -\sin x$ in the interval $0 \leq x \leq 2\pi$. [8]

b From the graphs drawn in part *a*, find all values of x that satisfy the equation $2\cos\frac{1}{2}x = -\sin x$. [2]

b) $x = \pi$



$y = 2\cos\frac{1}{2}x$

$a = 2$

$b = \frac{1}{2}$

$per = \frac{2\pi}{\frac{1}{2}} = 4\pi$

$interval = \frac{4\pi}{4} = \pi$

$y = -\sin x$

*reflection

$a = 1$

$b = 1$

$per = 2\pi$

$interval = \frac{2\pi}{4} = \frac{\pi}{2}$

9. Steamboat Problem: Mark Twain sat on the deck of a river steamboat. As the paddle wheel turned, a point on the paddle blade moved so that its distance, d, in feet, from the water's surface was a sinusoidal function of time t, in seconds. When Twain's stopwatch read 4 s, the point was at its highest, 16 ft above the water's surface. The wheel's diameter was 18 ft , and it completed a revolution every 10 s.

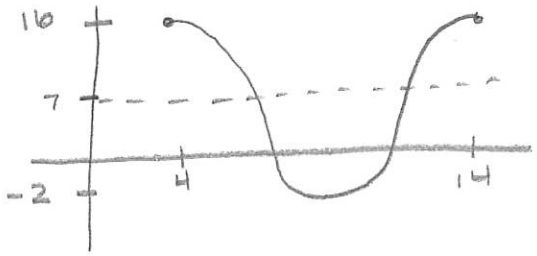
a. Sketch the graph of the sinusoid.

max = 16 at t = 4

d = 18

so min = −2

period: 10



b. What is the lowest the point goes? Why is it reasonable for this value to be negative?

−2 → it went 2 ft below the water's surface

c. Find a particular equation for distance as a function of time.

amp: $\frac{1}{2}|16-(-2)| = \frac{1}{2}(18) = 9$

$d = 9\cos\left[\frac{\pi}{5}(t-4)\right]+7$

freq: $2\pi/10 = \pi/5$

HS → Right 4

midline: $\frac{16+(-2)}{2} = y = 7$

VS = 7

d. How far above the surface was the point when Mark's stopwatch read 17 s?

$d = 9\cos\left[\frac{\pi}{5}(17-4)\right]+7$

$d = 4.218\ldots$ ft

e. What is the first positive value of t at which the point was at the water's surface? At that time, was the point going into or coming out of the water? How can you tell?

$0 = 9\cos\left[\frac{\pi}{5}(t-4)\right]+7$

* use calc
* graph
* find 1ST zero

$t \approx 7.918\ldots$ seconds

going into the water because the wheel goes from above the water's surface (x-axis) to below