

§ 1.5

5pts context 45+5=50pts

① 1pt One period is one wavelength of sine or cosine

② 1pt The amplitude is half the distance between the max & min y-value.



③ 1pt For  $y = a \sin(bx - c) + d$ ,

$bx - c = b(x - \frac{c}{b}) \Rightarrow \frac{c}{b}$  is the initial/start point of the "shape".

④ 1pt For  $y = a \cos(bx - c) + d$ ,  $y = d$  represents the MIDLINE of the graph.

Ex 5-18. Find period and amplitude  $a$ .

⑤  $y = 2 \sin(5x) \Rightarrow a = 2 = \text{amp}$  1pt

$5x = 2\pi \Rightarrow x = \frac{2\pi}{5} = \text{period} = T$  1pt

⑥  $y = 3 \cos(2x) \Rightarrow a = 3$  &  $T = \frac{2\pi}{2} = \pi = T$  1pt

$2x = 2\pi \Rightarrow x = \pi = T$  1pt

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(9)  $y = \frac{1}{2} \sin\left(\frac{\pi x}{3}\right) \Rightarrow a = \frac{1}{2}$  (1pt)

$\frac{\pi x}{3} = 2\pi \Rightarrow$

$x = \frac{2\pi \cdot 3}{\pi} = 6 = T$  (1pt)

#s 19-30 Describe the relationship between f and g. Consider Amp, T, shift

(19)  $f(x) = \sin x$   
 $g(x) = \sin(x - \pi)$

↑  
RIGHT  $\pi$

$a_f = a_g$  (same) (1pt)  
 $g = f(x)$  shifted right  $\pi$  units (1pt)

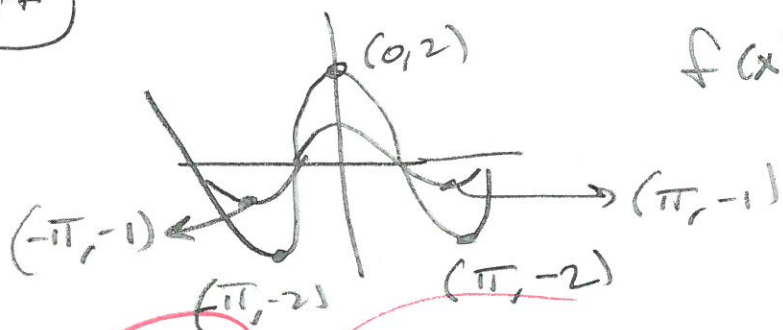
$T_f = T_g = 2\pi$  (1pt)

(22)  $f(x) = \sin(3x)$  and  $g(x) = \sin(-3x)$

$\rightarrow g(x)$  is reflection of  $f(x)$  across the y-axis (2pts)

(25)  $f(x) = \sin(2x)$ ,  $g(x) = 3 + \sin(2x)$   
 $T = \pi$  for both,  $a = 1$  for both.  
 $g$  is  $f$  shifted up 3 units (2pts)

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$f(x) = \frac{1}{2}g(x)$

Same  $T$ , no shift,

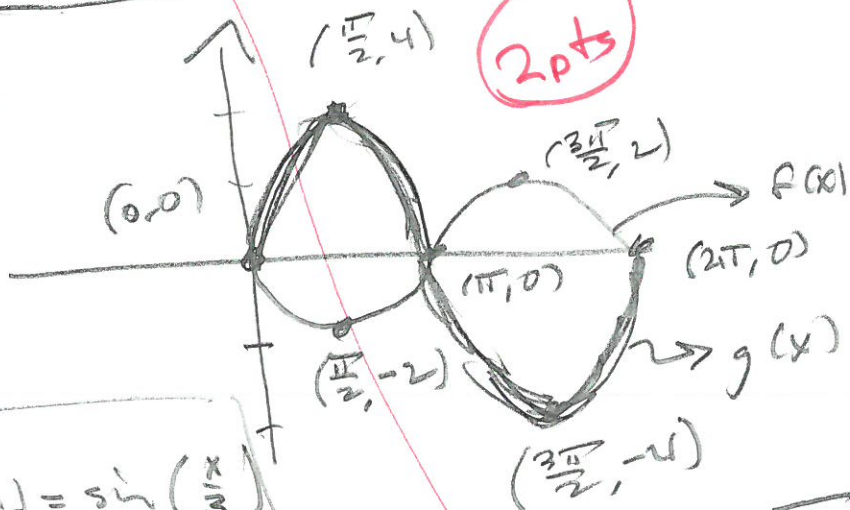
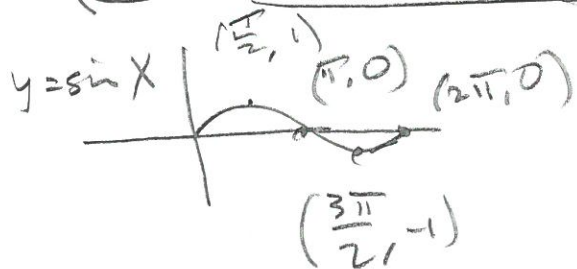
but  $g(x) = 2f(x)$

$\Rightarrow$  vertical stretch by a factor of 2.

2pts Don't be too mean

#s 31-38 sketch  $f$  &  $g$  in same coordinate plane (ugh!!)

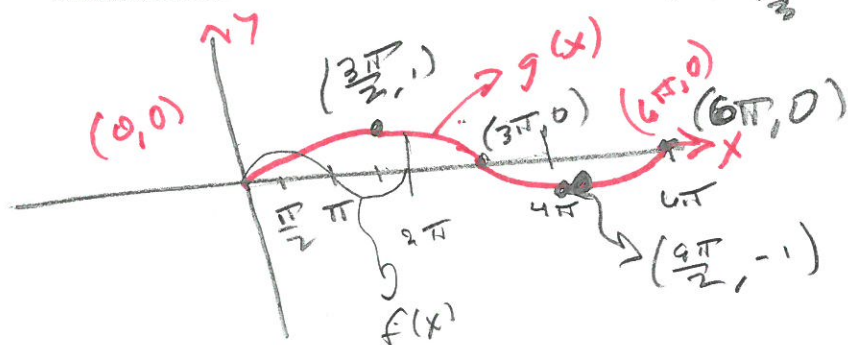
31  $f(x) = -2\sin(x)$ ,  $g(x) = 4\sin(x)$



2pts

32  $f(x) = \sin x$ ,  $g(x) = \sin(\frac{x}{3})$

$\frac{x}{3} = 2\pi \Rightarrow x = 6\pi = T$  for  $g$



2pts

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\* 39-60 Sketch the graph.

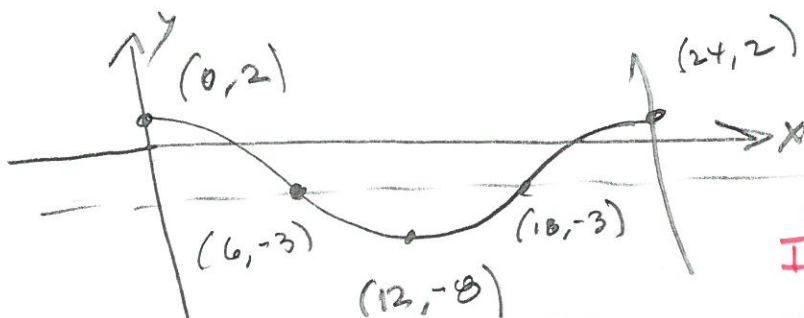
(54)  $y = -3 + 5 \cos\left(\frac{\pi t}{12}\right)$

$y = -3$  is mid.

$a = 5$  is amp

$\frac{\pi t}{12} = 2\pi \rightarrow$

$t = 24 = T$



6 pts total

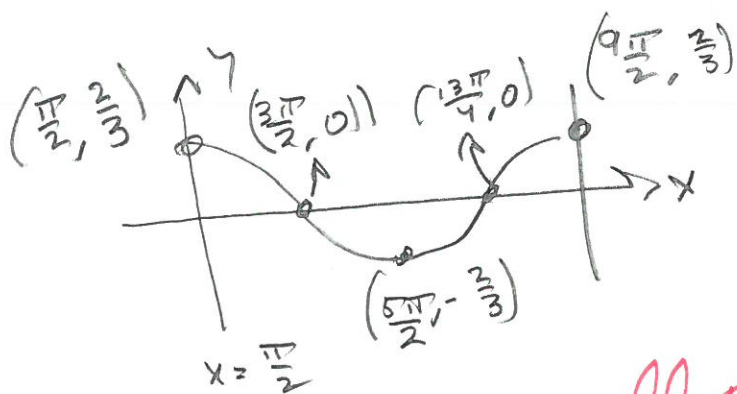
1 pt  
 $y = -3$   
 I want to see all 5 points labeled. (1 pt each)

(59)

$y = \frac{2}{3} \cos\left(\frac{x}{2} - \frac{\pi}{4}\right) = \frac{2}{3} \cos\left(\frac{1}{2}\left(x - \frac{\pi}{2}\right)\right)$

Amp.

$\frac{x}{2} = 2\pi \rightarrow x = 4\pi = \text{period. start } x = \frac{\pi}{2}$



$\frac{\pi}{2} + 4\pi = \frac{9\pi}{2}$

$\frac{9\pi/2 + \pi/2}{2}$

Show all 5 pts. (5 pts)

Shape of starting point (1 pt)



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Write an eqn for a sine curve

with period =  $T = 4\pi$ , Amp =  $a = 3$  left shift  $\frac{\pi}{4}$   
 $\downarrow$   
 $x + \frac{\pi}{4}$  inside

and down 1 unit

$y = -1$  = midline  
 $d = -1$

$b \cdot x = 2\pi$  when  $x = 4\pi \Rightarrow$

$4\pi b = 2\pi \Rightarrow$

$$y = 3 \sin\left(\frac{1}{2}\left(x + \frac{\pi}{4}\right)\right) - 1$$

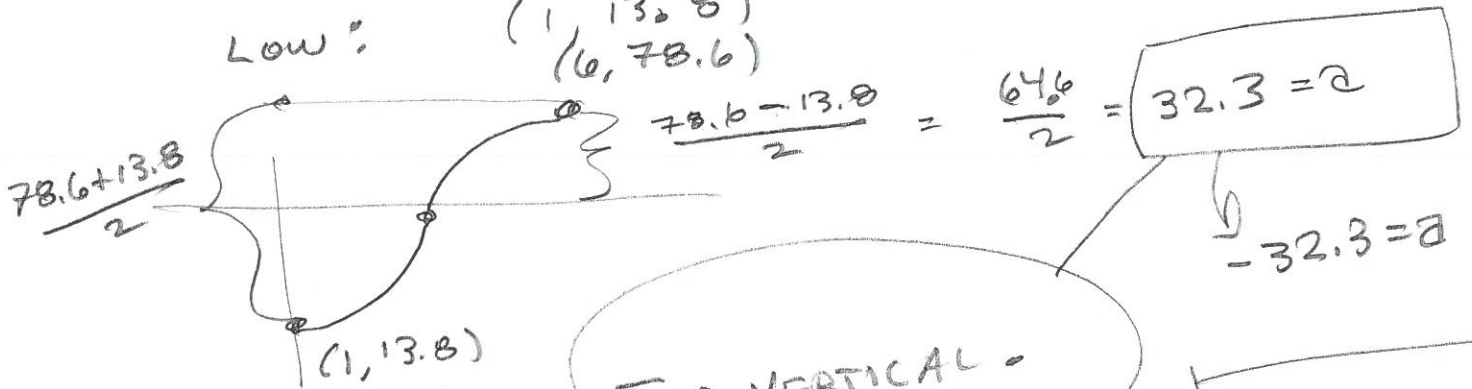
$$b = \frac{1}{2}$$

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Build cosine func.

HIGH: (7, 78.6)

LOW: (1, 13.8)  
 (6, 78.6)



Start @  $x = 1$ , FLIP VERTICAL

$$y = a \cos(b(x + c)) + d = -32.3 \cos\left(\frac{1}{2}(x - 1)\right) + 46.2$$

4 pts. 1 each for a, b, c, d.