[redacted]
Mat: 2410 Calc.

(3) Fi[illegible]tions of the equation $\sin(3x) = \frac{1}{2}$ [illegible]

very cramped.
ound is mottled. Should be all white.
rying to fill every square inch, left to right
l of letting the work breathe.

[illegible] in the interval [illegible]

(Chart from [illegible] I used [illegible] to calculate this.)

$x = \frac{\pi}{18} + \frac{2n\pi}{3}$ $x = \frac{\pi}{18} + \frac{2n\pi}{3}$

$x = \frac{5\pi}{18} + \frac{2n\pi}{3}$ ← These are our answers.

A) Solutions in $[0, 2\pi)$: $x = \frac{\pi}{18}, \frac{5\pi}{18}, \frac{13\pi}{18}, \frac{17\pi}{18}$

Part A: $[0, 2\pi)$

$n = 0$ $x = \frac{\pi}{18}\left(\frac{\pi}{18} + \frac{2n\pi}{3}\right) =$

$n = 1$ $x = \frac{\pi}{18} + \frac{2\pi}{3} = \frac{\pi}{18} + \frac{12}{18} = \frac{13\pi}{18}$

$n = 2$ $x = \frac{\pi}{18} + \frac{4\pi}{4} = \frac{\pi}{18} + \frac{24\pi}{18} = \frac{25\pi}{18}$

$n = 0$. $x = \frac{5\pi}{18}$ $x = \frac{5\pi}{18} + \frac{2n\pi}{3}$:

$n = 1$ $x = \frac{5\pi}{18} + \frac{2\pi}{3} = \frac{5\pi}{18} + \frac{12\pi}{18} = \frac{17\pi}{18}$

$n = 2$ $x = \frac{5\pi}{18} + \frac{4\pi}{3} = \frac{5\pi}{18} + \frac{24\pi}{18} = \frac{29\pi}{18}$

(4) Construct a cosine function that models the periodic data from the temperature table. Your model should have a period of 12 mo.

$T(x) = A\cos(B(x - C)) + D$ $T = A\cos \frac{\pi}{3} + B$ period = 12 months.

max t = July(7) min t = Jan(1) 30−10=20

$10\cos\frac{2\pi}{12}(x - 7) + 20$

(5) Given that $\tan(\beta) = \frac{13}{15}$ and $\sin(\beta) < 0$ find the exact values of the Other 5 trigonometric functions.

Sine & cosine = (+) tangent = (+)

$\tan(\beta)\ \frac{13}{15}$ $r = \sqrt{13^2 + 15^2} = \sqrt{169 + 225} = \sqrt{394}$

Sine $(\sin\beta) = \frac{-13}{\sqrt{394}}$ $(\csc\beta) = \frac{1}{\sin\beta} = \frac{\sqrt{394}}{-13}$

Cosine $(\cos\beta) = \frac{-15}{\sqrt{394}}$ $(\sec\beta) = \frac{1}{\cos\beta} = \frac{\sqrt{394}}{-15}$ $(\cot\beta) = \frac{15}{13}\ \frac{1}{\tan\beta}$

A) $(\sin\beta) = \frac{-13}{\sqrt{394}}$ | $(\cos\beta)\ \frac{-15}{\sqrt{394}}$ | $\tan\beta = \frac{13}{15}$

$(\csc\beta) = \frac{\sqrt{394}}{-13}$ | $(\sec\beta)\ \frac{\sqrt{394}}{-15}$ | $(\cot\beta)\ \frac{15}{13}$

(6) Suppose $A = 33°$, $a = 10$ cm, and $B = 15$ cm. A) show that there are two solutions to this triangle before solving. B) Law of Sines

$\frac{\sin(A)}{a} = \frac{\sin(B)}{b}$ $A = 33°$ $a = 10$ cm $b = 15$ cm $\sin B = \frac{15 \cdot \sin(33°)}{10} = 0.8169$ $(\sin(33°) = 0.5446)$

Acute $= \sin^{-1}(0.816) \approx 54.32°$

Obtuse $= 180° - 54.32 \approx 125.68°$

$\sin B = 0.8169$ $\frac{\sin C_1}{c} = \frac{\sin A}{a}$ $\sin(92.68) \approx 1$ $\frac{\sin C_2}{c} = \frac{\sin A}{a}$

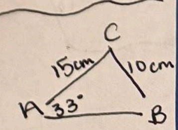
b. $B_1 = 54.32°$ $C = 180° - A - B_1 = 180° - 33° - 54.32° = 92.68$ $C_2 = 180° - A - B_2 = 180° - 33° - 125.68° = 21.32°$

$c = \frac{10 \cdot 1}{0.5446} \approx 18.36$ cm $B_2 = 125.68°$

$\sin 21.32 \approx 0.3633$ $\frac{10 \cdot 0.3633}{0.5446} = 6.67$ cm

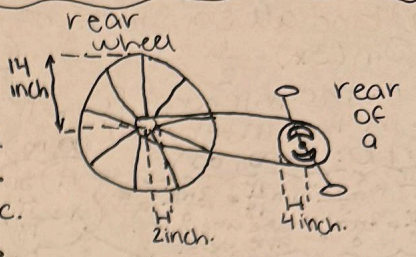
Triangle 1 = $B_1 \approx 54.32°$, $C_1 \approx 92.68°$, $c \approx 18.36$

Triangle 2 = $B_2 \approx 125.68°$, $C_2 \approx 21.32°$ $c \approx 6.67$



Bryelle Rummings
MAT 2410: Calc.

(1) The radii of the pedal sprocket, the wheel sprocket, & the wheel of the bicycle are 4 inches, 2 inches, and 14 inches, respectively. cyclist is pedal-ing at a rate of 1 revolution per sec. Find the speed the bicycle in ft. per sec. and miles per hour. See figure on right →



Shown Work:
Known Values:
14 inch. - bike wheel
2 inch - wheel sprocket
4 inch - pedal sprocket
1 inch - per sec.
? ft/sec and ? mph

@ 1 sec/revolution
$2\pi \times$ radius pedal spr.
$2\pi \times 4 = 8\pi$ inches

Per 1 sec = 8π inch/sec

wheel sprocket:
$\frac{4}{2} = 2$ revolutions

Circumference of rear wheel:
$2\pi \times 14$ inches $= 28\pi$ inches.

* we understand that each revolution = 2 revolutions, now we look @ distance.

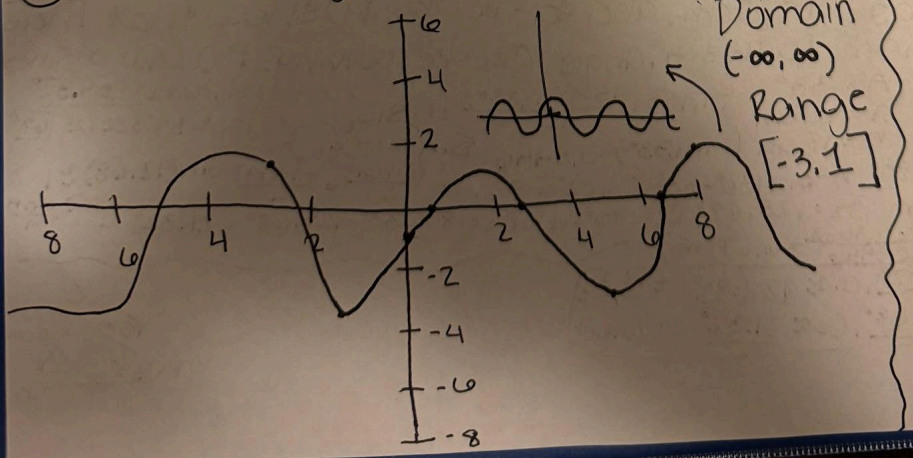
d/sec $= 2 \times 28\pi$ inch $= 56\pi$ inch./sec

Conversion ft/sec: $\frac{56\pi}{12} = 14.66$ ft/sec → $14.66 \times 0.681818 = \approx 10$ mph

Conversion mph: had to google the number for conversion! :) "

A) The speed of bike in ft/sec = 14.666 & mph = 10 mph!

(2) sketch the graph of $f(x) = 2\sin(\pi x) - 1$



Domain
$(-\infty, \infty)$
Range
$[-3, 1]$