Your Name

Your Signature

Student ID #

Quiz Section (circle one)

|        | Truman | Kelly | Hui |
|--------|--------|-------|-----|
| 12:30  | AB     | AD    |     |
| 1:30   | AA     | AC    | AE  |

Results will be posted on the Math 120A web page as soon as they are graded (by Sunday, May 19th at the latest). Please check one of the following boxes and sign above.

☐ Please post my score using the last five digits of my Student Number.

☐ Please post my score using the the following five digits:

☐ Please do not post my score. I realize that this means I will have to wait until Tuesday to learn my score.

| Problem | Total Points | Score |
|---------|--------------|-------|
| 1       | 15           |       |
| 2       | 11           |       |
| 3       | 12           |       |
| 4       | 12           |       |
| Total   | 50           |       |

- You are allowed to use one sheet (8.5 by 11 inches) of handwritten notes for this exam. (You may write on both sides.) You are not allowed to share notes.

- You may use a scientific calculator, but not a graphing calculator. You are not allowed to share calculators.

- In order to receive partial credit, you must show your work. Be wary of doing computations in your head. Instead, write out your computations on the exam paper.

- Your answers should either be *exact answers* (like $2\sqrt{2}$) or rounded to two digits after the decimal (like 2.83) in whatever units you're using. Be careful not to round intermediate calculations whenever possible.

- Place $\boxed{\textbf{YOUR FINAL ANSWER}}$ to each question in the box provided.

- If you need more room, use the backs of the pages and indicate to the grader that you have done so.

- Raise your hand if you have a question.

- Good luck!

1 (15 points)   You are modeling the sales of ice cream at the local ice cream parlor. You find that sales follow a sinusoidal pattern that repeats each year. The most ice cream sold on any one day is the 100 gallons sold on August 1. The average amount sold on any day was 60 gallons.

Here is a unit-less graph of two periods of $s(t)$, the sales of ice cream (in gallons) versus time $t$ in days (with January 1 as $t = 1$ and August 1 as day $t = 213$).
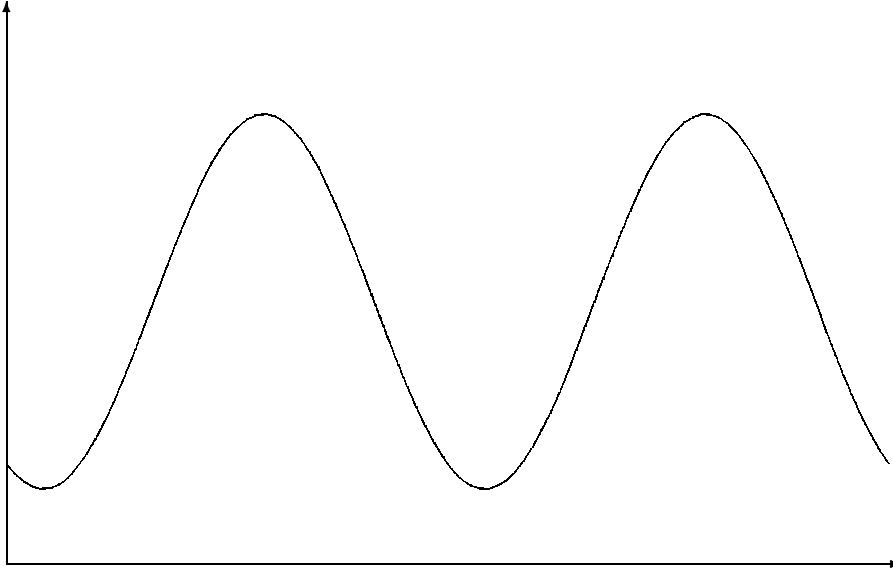


(a) (3 points)   Find the amplitude of the sinusoidal function graphed above.

amplitude is [          ] gallons

(b) (4 points)   The equation for the function $s(t)$ is, in standard form,

$$s(t) = A\sin\left(\frac{2\pi}{B}(t - C)\right) + D.$$

Find the values of $A$, $B$, $C$, and $D$.

$A =$ [          ]

$B =$ [          ]

$C =$ [          ]

$D =$ [          ]

(c) (4 points)   How much ice cream is sold on May 17th (day $t = 137$)?

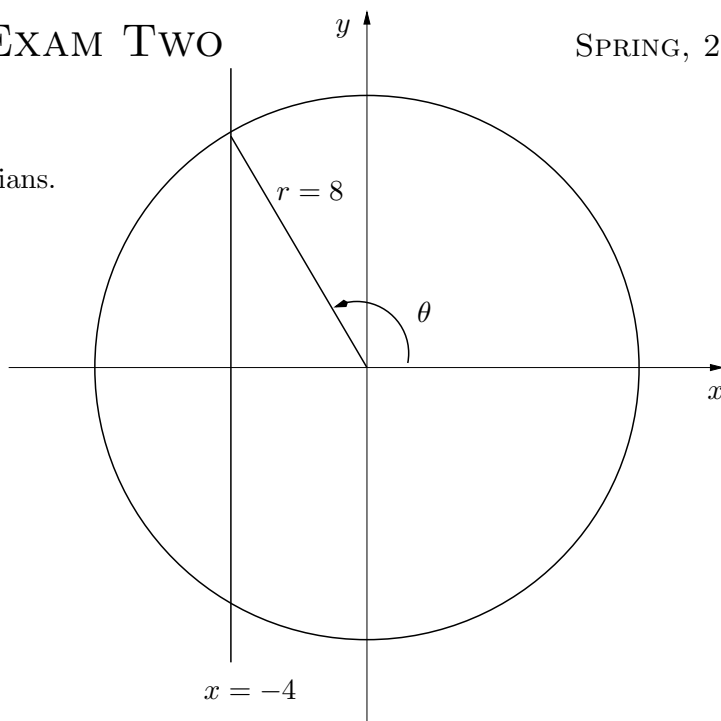$$\boxed{\phantom{xxxxxxxxxxxxxxxx}} \text{gallons.}$$

(d) (4 points)   Find two days (over the two periods shown in the graph) on which the sales of ice cream was 70 gallons. (Give your answer in terms of $t$, not in months and days. Round your $t$ values to 2 digits after the decimal.)

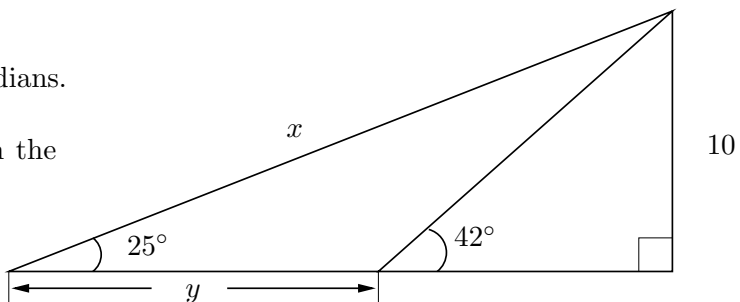At $t =$ $\boxed{\phantom{xxxxxxxxxx}}$ and $t =$ $\boxed{\phantom{xxxxxxxxxx}}$ .

2 (11 points)

(a) (4 points) Find the angle $\theta$ in radians.

$y$

$r = 8$

$\theta$

$x$

PSfrag replacements

$x = -4$

$\theta = $ [            ] radians.

PSfrag replacements

(b) (3 points)   Find the length $x$ in the triangle to the right.

$x$

10
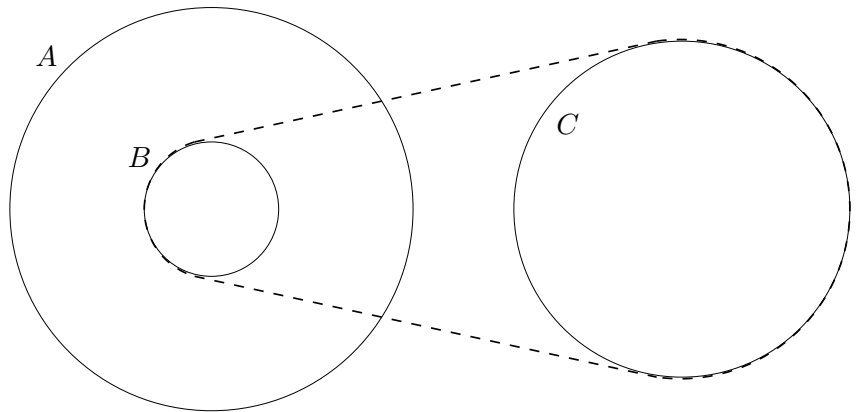
$25°$

$42°$

$y$

$x = $ [            ].

(c) (4 points)   Find the length $y$ in the triangle from part (b).

$y = $ [            ].

3 (12 points)　Consider the following picture. Wheels $A$ and $B$ are fastened at the axle, so they rotate together. Wheels $B$ and $C$ are connected by a belt.

$A$

$B$

$C$

PSfrag replacements

(a) (6 points)　Wheel $A$ rotates at 200 revolutions per minute (RPM). Wheel $A$ has radius 5 inches, and wheel $B$ has radius 2 inches. Find how fast a point on wheel $B$ moves in inches per second.
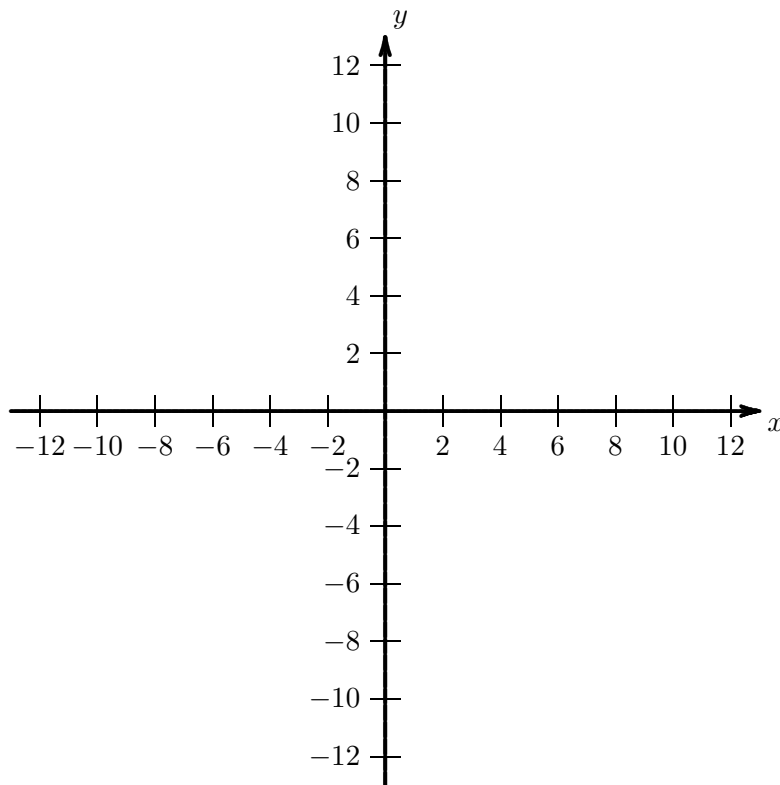
in / sec.

(b) (6 points)　Wheel $C$ has radius 4 inches. Find how fast this wheel spins, in RPM. (Recall that wheel $A$ rotates at 200 RPM, wheel $A$ has radius 5 inches, and wheel $B$ has radius 2 inches.)

RPM.

4 (12 points)   Let $f(x) = \dfrac{6 - 3x}{x - 6}$.

(a) (6 points)   Graph $y = f(x)$ on the axes below.  Show and label all asymptotes and points where the curve crosses either axis.  Plot and label at least four points.



(b) (6 points)   Recall that $f(x) = \dfrac{6 - 3x}{x - 6}$.  Find $f^{-1}(x)$ and its domain and range.

$f^{-1}(x) =$

Domain:

Range: