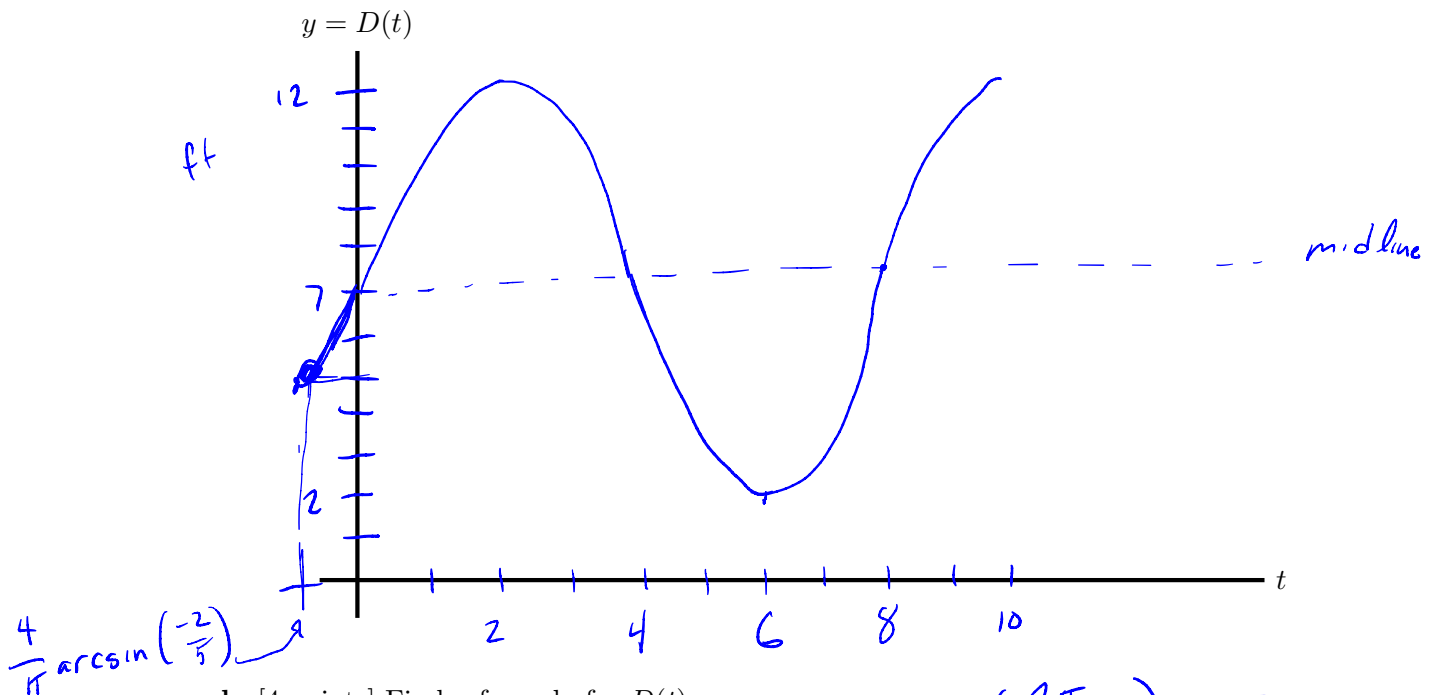


6. [13 points] The alternative rock band π 'd-Eye-Blind was unhappy with the first music video and are trying again. There is just one camera on a drone, which again moves in a circle at a constant speed, between a maximum of 12 feet above the ground and a minimum of 2 feet above the ground. At time $t = 0$ it is halfway between the maximum and minimum height, and moving upward. It makes one full circle in 8 seconds.

Let $D(t)$ be the height of the drone t seconds after they start filming.

- a. [4 points] Sketch a graph of $y = D(t)$ for $0 \leq t \leq 10$. Be sure to label your axes, and pay careful attention to the shape of your graph.



- b. [4 points] Find a formula for $D(t)$.

Answer: $D(t) = 5 \sin\left(\frac{2\pi}{8}t\right) + 7$

- c. [5 points] Find all times at which the drone is exactly 5 feet above the ground for $0 \leq t \leq 10$. Show your work, and give your answers in exact form.

Note: based on graph, there should be 2 such times.

$$5 \sin\left(\frac{\pi}{4}t\right) + 7 = 5$$

$$5 \sin\left(\frac{\pi}{4}t\right) = -2$$

$$\sin\left(\frac{\pi}{4}t\right) = -\frac{2}{5}$$

One time:

$$\frac{\pi}{4}t = \arcsin\left(-\frac{2}{5}\right)$$

$$t = \frac{4}{\pi} \arcsin\left(-\frac{2}{5}\right)$$

but this is < 0 .

$$t = 8 + \frac{4}{\pi} \arcsin\left(-\frac{2}{5}\right)$$

$$\text{and } 4 - \frac{4}{\pi} \arcsin\left(-\frac{2}{5}\right).$$