

Math 120 A Spring 2017
Mid-Term Exam Number Two
May 18, 2017
Answers

There were two versions of the exam.

In version A, in problem 1, pulley A had a radius of 3 cm.

1. 5.46 cm
2. 117.12 years after 1930
3. 37.85714 hours
4. (a) $g(x) = f(x - 2) + 1 = \left| \frac{1}{x}(x - 2) - 3 \right| + 1 = \left| \frac{1}{2}x - 4 \right| + 1 =$

$$\begin{cases} \frac{1}{2}x - 3 & \text{if } \frac{1}{2}x - 4 \geq 0, \\ -\frac{1}{2}x + 5 & \text{if } \frac{1}{2}x - 4 < 0 \end{cases} = \begin{cases} \frac{1}{2}x - 3 & \text{if } x \geq 8, \\ -\frac{1}{2}x + 5 & \text{if } x < 8. \end{cases}$$

(b) Solving $\frac{1}{2}x - 3 = x$ yields $x = -6$ which is not ≥ 8 , so this is not a fixed point. Solving $-\frac{1}{2}x + 5 = x$ yields $x = \frac{10}{3}$ which is < 8 , so this is the only fixed point.

In version B, in problem 1, pulley A had a radius of 6 cm.

1. 10.64 cm
2. 118.915 years after 1930
3. 32.7272 hours
4. (a) $g(x) = \left| \frac{1}{3}(x - 4) - 7 \right| + 5 = \left| \frac{1}{3}x - \frac{25}{3} \right| + 5 =$

$$\begin{cases} \frac{1}{3}x - \frac{25}{3} + 5 & \text{if } \frac{1}{3}x - \frac{25}{3} \geq 0 \\ -\frac{1}{3}x + \frac{25}{3} + 5 & \text{if } \frac{1}{3}x - \frac{25}{3} < 0 \end{cases} = \begin{cases} \frac{1}{3}x - \frac{10}{3} & \text{if } x \geq 25 \\ -\frac{1}{3}x + \frac{40}{3} & \text{if } x < 25. \end{cases}$$

(b) Solving $\frac{1}{3}x - \frac{10}{3} = x$ yields $x = -5$ which is not ≥ 25 so this is not a fixed point. Solving $-\frac{1}{3}x + \frac{40}{3} = x$ yields $x = 10$ which is < 25 so this is the only fixed point.