

Math 132: Calculus for Physical and Life Sciences 2
Extra Credit Problem Set 10
Due Wednesday, April 30, no later than 5:00pm

Selected Answers

1. Center of mass at

$$\bar{x} = \frac{M_y}{M} = \frac{\frac{9\pi^2}{2} - 1}{6\pi + 1} \doteq 2.187.$$

3. (a) $c = \frac{\ln(.9)}{-6} \doteq .01756.$

(c) $\bar{t} \doteq 56.95$ months.

4. (a) About 42% of the students will take between 1.5 and 2.5 hours.

(c) Median time = 2.523 hours.

5. (a)

$$f(x) = \frac{1}{\sqrt{450\pi}} e^{-(x-100)^2/450}.$$

(c) About 0.3% of the population.

6. The constant $\frac{1}{\sqrt{2\pi\sigma^2}}$ in the formula for the normal density is irrelevant for the location of the critical number(s) and the inflection points, so we will ignore it and consider the following function $g(x)$ and its derivatives:

$$\begin{aligned} g(x) &= e^{-(x-\mu)^2/(2\sigma^2)} \\ \Rightarrow g'(x) &= -e^{-(x-\mu)^2/(2\sigma^2)} \cdot (x-\mu)/\sigma^2 \quad (\text{chain rule}) \\ \Rightarrow g''(x) &= -e^{-(x-\mu)^2/(2\sigma^2)} \left(\frac{1}{\sigma^2} - \frac{(x-\mu)^2}{\sigma^4} \right) \quad (\text{product rule}). \end{aligned}$$