1.4.4 Exploratory Quiz: Thinking about the Attenuation μ(x)

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Question 1

1/1 point (graded)

This problem is to prepare you for the next video.

Suppose you have a mystery function $\mu(x)$ and all you know is that $\mu(x)$ is continuous and

$$\int_0^1 \mu(x)\,dx = 1/3.$$

Which of the following are possibilities for $\mu(x)$? Choose all that apply.

(Note: if $\mu(x)$ were an actual attenuation function, it could not be negative at any point, making some of the answers not valid as attenuation functions. However, ignore this physical constraint for this problem - the point is to explore the issue of finding $\mu(x)$ from integral information, discussed in more detail in the next video.)

- [x] A. $\mu(x) = \frac{1}{3}$ ✔
- [x] B. $\mu(x) = 2x - \frac{2}{3}$ ✔
- [x] C. $\mu(x) = x^2$ ✔
- [ ] D. $\mu(x) = x^3$
- [x] E. $\mu(x) = \frac{\pi}{6}\cos(\frac{\pi}{2}x)$ ✔
- [ ] F. $\mu(x) = -\frac{\pi}{6}\sin(\frac{\pi}{2}x)$

✔

Explanation

(Can you think of another function (not in the list above) that could be $\mu(x)$?)
A, B, C, and E are all possible. There are many other possible $\mu(x)$ that satisfy this integral.

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Answers are displayed within the problem

Question 2: Think About It...

1/1 point (graded)

What other information about $\mu(x)$, other than knowing $\mu(x)$ itself, could help you narrow down further the choices you made in the previous part? Be as specific as possible.

attenuation values for different thickness

Thank you for your response.

See the next section.

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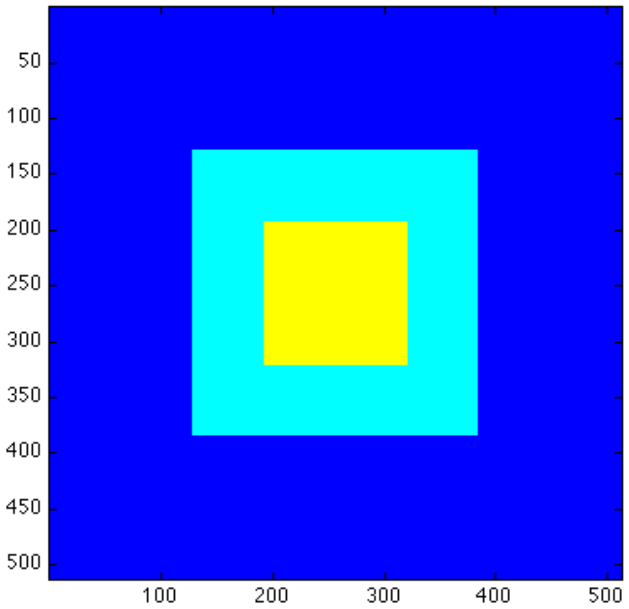
Answers are displayed within the problem

Question 3

1/1 point (graded)

Consider the following two-dimensional object, where the different colors represent different attenuation coefficients of the material.



View Larger Image

Image Description

If we wanted to write a function μ that describes the attenuation at each point in this 2D object, how many variables should μ be a function of?

- 1
- 2 ✔
- 3
- more than 3.

Explanation
Since the attenuation of this square object varies with both the x and y position, we'd need two variables, a function $\mu(x, y)$.

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Answers are displayed within the problem

Question 4

1/1 point (graded)
Think about your torso, the portion of your body below your head and above your waist. If we wanted to write a function μ that describes the attenuation at each point in your torso, how many variables would you expect μ be a function of?

- 1
- 2
- 3 ✔
- more than 3.

Explanation
Since your torso is three dimensional and the attenuation of your torso varies in three directions (left-right, front-back, and up-down), the attenuation function would need to have three variables. Each point could be described as (x, y, z), relative to say your left side, the front of your torso and your waist. The function would be $\mu(x, y, z)$, giving the attenuation at the point (x, y, z,).

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

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