Math 104- Rimmer Name_____
Hand in Hw # 8

Spring 2013

PROBLEM 8: Find the constant C so that the function

$$f(x) = \begin{cases} C\sqrt{x-1}, & 1 \le x \le 2; \\ 0, & \text{otherwise.} \end{cases}$$

is a probability density function, and then compute its mean m.

(a) $C = 4,\ m = \frac{9}{5}$ (b) $C = \frac{3}{2},\ m = \frac{3}{5}$ (c) $C = 2,\ m = 1$

(d) $C = 3,\ m = \frac{8}{5}$ (e) $C = \frac{3}{2},\ m = \frac{7}{5}$ (f) $C = \frac{3}{2},\ m = \frac{8}{5}$

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Fall 2012

12. Consider the probability density function $f(x)$ defined by $f(x) = 2(x+1)^{-3}$ for $x \geq 0$ and $f(x) = 0$ for $x < 0$. Then the **mean** of the probability density function $f(x)$ is:

(a) 0 (b) 1 (c) $\frac{3}{2}$ (d) 2 (e) $\frac{5}{3}$ (f) 4

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Spring 2012

6. The distance $y(t)$ traveled by some object satisfies the equation

$$\sqrt{t}\,\frac{dy}{dt} = e^{\sqrt{t}-y}, \quad t > \tfrac{1}{2}.$$

If $y(1)=1$, what is $y(4)$?

A) $\ln\left(3e^3 - e\right)$ B) $\ln\left(4e - e^2\right)$ C) $\ln\left(2e^2\right)$

D) $\ln\left(3e - 1\right)$ E) $\ln\left(2e^2 - e\right)$ F) 4

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Spring 2011

11. A certain random variable has probability density function $f(x)$ given by $f(x) = xe^{-x}$ for $x > 0$, and $f(x) = 0$ for $x \leq 0$. Find the mean of this random variable.

(a) -2 (b) -1 (c) 0 (d) 1 (e) 2 (f) 3

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Fall 2010

8. Find the solution to the initial-value problem

$$\frac{dy}{dx} = \frac{e^{-\sqrt{x}}}{y^2\sqrt{x}} \qquad y(0) = 3.$$

(A) $y = (33 - 6e^{-\sqrt{x}})^{1/3}$

(B) $y = (45 - 18e^{-\sqrt{x}})^{1/3}$

(C) $y = (9 + 18e^{-\sqrt{x}})^{1/3}$

(D) $y = (30 - 3e^{-\sqrt{x}})^{1/3}$

(E) $y = \dfrac{3}{(2 - e^{-\sqrt{x}})^{1/3}}$

(F) $y = \dfrac{9}{(45 - 18e^{-\sqrt{x}})^{1/3}}$

(G) $y = \dfrac{9}{(9 + 18e^{-\sqrt{x}})^{1/3}}$

(H) $y = \dfrac{3}{(9 - 8e^{-\sqrt{x}})^{1/3}}$

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Fall 2010

9. In a certain chemical reaction, the amount A of reactant decreases at a rate proportional to A^2. That is

$$\frac{dA}{dt} = -kA^2$$

for some positive constant k. If there are 4 grams of the reactant present at time $t = 0$, and there are 2 grams of it present at time $t = 10$ seconds, at what time will there be 1 gram of the reactant present?

(A) $t = 15$ seconds (B) $t = 20$ seconds (C) $t = 25$ seconds (D) $t = 30$ seconds
(E) $t = 45$ seconds (F) $t = 60$ seconds (G) $t = 90$ seconds (H) $t = 100$ seconds

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Math 114 Spring 2010

5. The function $y(t)$ satisfies the equation $\frac{dy}{dt} + 2ty = y$ and $y(0) = 5$. What is $y(1/2)$?

(a) 5
(b) 0
(c) $e^{1/4}$
(d) $5e^{1/4}$
(e) $-5e^{1/4}$
(f) $-e^{1/4}$
(g) -5
(h) e

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ANSWERS:

SPRING 2013 # 8: F

FALL 2012 # 12: B

SPRING 2012 # 6: E

SPRING 2011 # 11: E

FALL 20010 # 8: A

FALL 20010 # 9: D

Math 114 SPRING 20010 # 5: D