

**Math 327 Homework 3**  
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**Question 4.2**

$x$	0	1	2	3
$f(x)$	$\frac{27}{64}$	$\frac{27}{64}$	$\frac{9}{64}$	$\frac{1}{64}$

$$E(X) = \sum_{x=0}^3 x \cdot f(x) = 0 \cdot \frac{27}{64} + 1 \cdot \frac{27}{64} + 2 \cdot \frac{9}{64} + 3 \cdot \frac{1}{64} = \frac{3}{4}$$

**Question 4.4**

$$P(H) = \frac{3}{4}, P(T) = \frac{1}{4}$$

$x$	0	1	2
$f(x)$	$\frac{9}{16}$	$\frac{6}{16}$	$\frac{1}{16}$

$$E(X) = 0 \cdot \frac{9}{16} + 1 \cdot \frac{6}{16} + 2 \cdot \frac{1}{16} = \frac{1}{2}$$

**Question 4.10**

$$\mu_X = 1 \cdot 0.17 + 2 \cdot 0.50 + 3 \cdot 0.33 = 2.16$$

$$\mu_Y = 1 \cdot 0.23 + 2 \cdot 0.50 + 3 \cdot 0.27 = 2.04$$

**Question 4.14**

$$E(X) = \int_0^1 \frac{x \cdot 2(x+2)}{5} dx = \frac{8}{15}$$

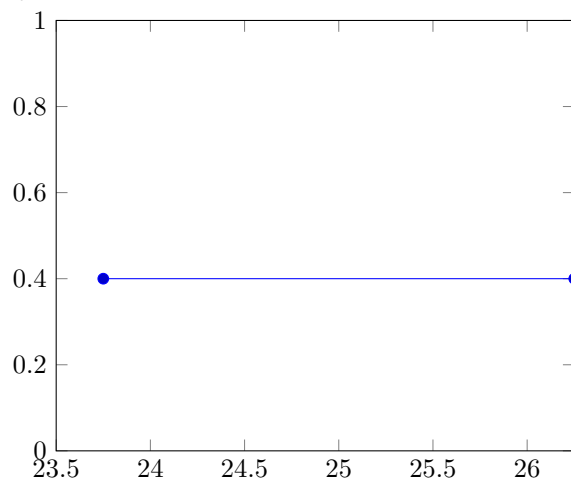
**Question 4.18**

$$E(X^2) = \sum_{x=0}^3 x^2 \cdot f(x) = 0 \cdot \frac{27}{64} + 1 \cdot \frac{27}{64} + 4 \cdot \frac{9}{64} + 9 \cdot \frac{1}{64} = \frac{9}{8}$$

**Question 4.20**

$$E(e^{2X/3}) = \int_0^\infty e^{2x/3} \cdot e^{-x} dx = 3$$

**Question 4.28**



$$E(X) = \int_{23.75}^{26.25} \frac{2}{5} x dx = 25$$

Not suprised, this is the expected value as it is exactly in the middle of the interval.

**Question 4.34**

$$\mu_X = (-2)(0.3) + (3)(0.2) + (5)(0.5) = 2.5$$

$$\sigma_X^2 = \sum x^2 f(x) - \mu_X^2$$

$$\sum x^2 f(x) = (4)(0.3) + (9)(0.2) + (25)(0.5) = 15.5$$

$$\sigma_X^2 = 15.5 - 2.5^2 = 9.25$$

$$\sigma = 3.04138...$$

**Question 4.38**

$$\mu_X = \frac{8}{15}$$

$$\sigma_X^2 = \int_0^1 x^2 \frac{2(x+2)}{5} dx - \mu_X^2$$

$$\int_0^1 x^2 \frac{2(x+2)}{5} dx = \frac{11}{30}$$

$$\sigma_X^2 = \frac{11}{30} - \left(\frac{8}{15}\right)^2 = \frac{37}{450}$$

**Question 4.40**

$$g(X) = 3X^2 + 4$$

$$\mu_{g(X)} = \int_0^1 (3x^2 + 4) \frac{2(x+2)}{5} dx = 5.1$$

$$\sigma_{g(X)}^2 = \int_0^1 (3x^2 + 4)^2 \frac{2(x+2)}{5} dx - \mu_{g(X)}^2$$

$$\int_0^1 (3x^2 + 4)^2 \frac{2(x+2)}{5} dx = \frac{671}{25}$$

$$\sigma_{g(X)}^2 = \frac{671}{25} - (5.1)^2 = 0.83$$

**Question 4.46****Question 4.58****Question 4.60****Question 4.62****Question 4.64****Question 4.76****Question 4.92****Question 4.98**