CENTER FOR WOMEN AND GENDER

HW: Continuous random variables

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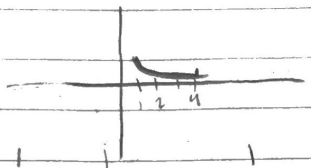
2.2: 1, 2, 3, 4, 6, 11

1a) Continuous
b) Letter = discrete
c) continuous
d) continuous
e) discrete
f) either, regarded as discrete.

2a)



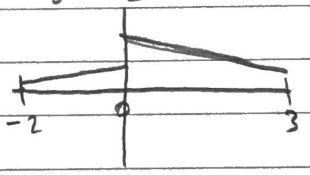
b) $\int_4^6 \frac{1}{x\ln(1.5)}dx = \frac{1}{\ln(1.5)} \times \ln(x)\Big|_4^6 = \boxed{1}$

c) $\int_{4.5}^{5.5} \frac{1}{x\ln(1.5)}dx = \frac{1}{\ln(1.5)} \times \ln(x)\Big|_{4.5}^{5.5} = \boxed{0.495}$

d) $F(x) = \int_4^x \frac{1}{y\ln(1.5)}dy = \boxed{\frac{1}{\ln(1.5)} \times (\ln(x) - \ln(4)), \text{ for } 4 \le x \le 6}$

3a) $\int_{-2}^{0} \frac{15}{64} + \frac{x}{64}dx = \frac{7}{16}$, $\int_0^3 \left(\frac{8}{3} + Cx\right)dx = \frac{9}{8} + \frac{9}{2}C$

$1 - \frac{7}{16} - \frac{9}{8} = \frac{9}{2}C$ $\boxed{C = -\frac{1}{8}}$



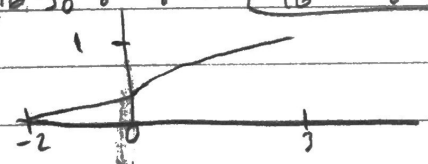
b) $P(-1 \le X \le 1) =$

$\int_{-1}^{0} \frac{15+x}{64}dx + \int_0^1 \frac{8}{8} + -\frac{1}{8}x\,dx$

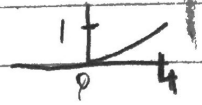
$= \boxed{\frac{69}{128}}$

c) $F(x) = \int_{-2}^{x} \frac{15+x}{64}dy = \boxed{\frac{x^2}{128} + \frac{15x}{64} + \frac{7}{16} \quad \text{for } -2 \le x \le 0}$

$F(x) = \frac{7}{16} + \int_0^x \frac{3}{8} - \frac{y}{8}dy = \boxed{-\frac{x^2}{16} + \frac{3x}{8} + \frac{7}{16} \quad \text{for } 0 \le x \le 3}$



4a)

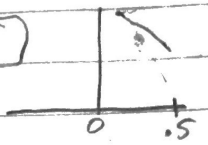


b) $P(X \le 2) = F(2) - F(0) = .25 - 0 = \boxed{\frac{1}{4}}$

c) $P(1 \le x \le 3) = F(3) - F(1) = \frac{9}{16} - \frac{1}{16} = \boxed{\frac{1}{2}}$

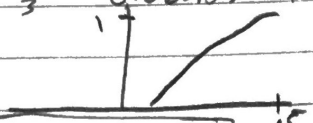
d) $\boxed{f(x) = \frac{d}{dx}F(x) = \frac{x}{8} \quad \text{for } 0 \le x \le 4}$

6a) $\int_{.125}^{.5} A(.5-(x-.25)^2)\,dx = 1$, $\boxed{A = 5.5054}$



b) $F(x) = \int_{.125}^{x} 5.5054(.5-(y-.25)^2)\,dy$

$= 5.5054\left(\frac{x}{2} - \frac{(x-0.25)^3}{3} - 0.06315\right)$ for $.125 \le x \le .5$



c) $P(x \le .2) = \boxed{F(.2) = 0.203}$

11a) $\int_{10}^{11} Ax(130-x^2)\,dx = 1$, $\boxed{A = \frac{4}{819}}$

b) $F(x) = \int_{10}^{x} \frac{4y}{819}(130-y^2)\,dy = \frac{4}{819}\left(65x^2 - \frac{x^4}{4} - 4000\right)$ for $10 \le x \le 11$

c) $P(10.5 \le x \le 10.5) = F(10.5) - F(10.5) = .623 - .340 = \boxed{0.283}$