**First Name :** _____         **Last Name :** _____

**You are encouraged to work on this assignment in groups.**
**If you have not learned any of the topics related to the following questions, please try to learn it before submitting this assignment.**

**Part 1: Evaluate the following. (Show your work to get full points).**

(a) $7!$

(b) $\displaystyle\sum_{x=1}^{20} x$

(c) $\displaystyle\sum_{i=1}^{20} w$

(d) When $c$ is a constant, $\displaystyle\sum_{x=1}^{3} [\, cx^3 + 1\,]$

(e) Expand $(x - 4)^2$

(f) For $\lambda > 0$, find $\displaystyle\sum_{x=0}^{\infty} \frac{\lambda^x}{x!} =$

(g) If $p(x) = \begin{cases} \dfrac{1}{8} & ;\ x = 0, 3 \\ \dfrac{3}{8} & ;\ x = 1, 2 \\ 0 & ;\ \text{otherwise} \end{cases}$ , then

compute $\displaystyle\sum_{all\ x} [\, xp(x)\,]$

and compute $\displaystyle\sum_{all\ x} [\, (x - 1.5)^2 p(x)\,]$

(h) $\displaystyle\int_1^3 x^2 dx$

(i) $\displaystyle\int_0^1 (x^3 + 1)dx$

(j) When $k$ is a constant, $\displaystyle\int_0^\infty \left[ k\,e^{-\frac{x}{3}} \right] dx$

(k) If $f(x) = \begin{cases} 3\,x^{-4} \;;\; x > 1 \\ 0 \;;\; \text{otherwise} \end{cases}$, then

   compute $\displaystyle\int_{-\infty}^\infty [\,xf(x)\,]\,dx$

   and compute $\displaystyle\int_{-\infty}^\infty [\,x^2 f(x)\,]\,dx$

(l) $\displaystyle\int_0^y ye^{-y}e^{-x}dx$

(m) $\displaystyle\int_0^1 \int_0^x (1 + x^2 y)\,dy\,dx$

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(n) If $p(x,y) = \begin{cases} \dfrac{1}{3} & ; \quad (x,y) = (-1,1), (0,0), (1,1) \\ 0 & ; \quad \text{otherwise} \end{cases}$ , then

compute $\displaystyle\sum_{\text{all } x}\sum_{\text{all } y}[\, x\, p(x,y)\,]$

and compute $\displaystyle\sum_{\text{all } x}\sum_{\text{all } y}[\, x\, y\, p(x,y)\,]$

**Part 2: Sketch each of the following functions on separate x-y planes.**

(a) $f(x) = \begin{cases} 2x & ; \quad -0.5 < x < 0 \\ 0 & ; \quad \text{otherwise} \end{cases}$

(b) $f(x) = \begin{cases} 5e^{-5x} & ; \quad x > 0 \\ 0 & ; \quad \text{otherwise} \end{cases}$

(c) $f(x) = \begin{cases} \dfrac{1}{2\pi} & ; \quad -\pi < x < \pi \\ 0 & ; \quad \text{otherwise} \end{cases}$

(d) $f(x) = \begin{cases} 0 & ; \quad x < 0 \\ \dfrac{x^2}{4} & ; \quad 0 \le x < 1 \\ \dfrac{x+1}{4} & ; \quad 1 \le x < 2 \\ 1 & ; \quad x \ge 2 \end{cases}$

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