BUS 419
Preliminary Mathematics/Statistics Assignment

NOTE: This assignment is only for information and review purposes. **The results of the assignment only count toward the class participation score**. The only consequence from a failure to submit the assignment is a reduction in the participation component of the overall grade assessment. If you cannot do a question then it is possible to write: 'Do not know, this was not covered in pre-requisite class' as a possible answer.

**** Be sure to provide the following information on your answer sheet **:**

a) Your name; b) The courses and instructors taken to satisfy the mathematics/statistics prerequisites and the BUS 315 and BUS 316 (or equivalent) prerequisites for this course; c) If you are a college or international transfer student, indicate the school, e.g., FIC (Fraser International College), which you previously attended. If you are a SFU student indicate the instructor(s) who taught your prerequisite courses.

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1) Evaluate by providing a numerical solution or simplify the expression where possible, otherwise expand the summation or formula listing all relevant terms:

$$a)\ \sum_{t=0}^{10} t \qquad b)\ \ln\{\exp[a]\} \equiv \log_e\{e^{a}\}$$

$$c)\ \sum_{i=1}^{3} \sigma_i^2 X_i^2 + 2\sum_{i>j} X_i X_j \sigma_{ij} = \sum_{j=1}^{3}\sum_{i=1}^{3} X_i X_j \sigma_{i,j}$$

$$d)\ \exp[a]/\exp[bx] \equiv e^{a} / e^{bx} \qquad e)\ (x+y)^3$$

$$f)\ \ln(1+x) \textit{ for } x \textit{ small} \quad (\textit{How small is small?})$$

2) Differentiate the function y with respect to the variable x, i.e., evaluate dy / dx:

$$a)\ y = \frac{1}{\{1+x\}^n} \qquad b)\ y = \sum_{t=1}^{T} \frac{1}{\{1+x\}^t} \qquad c)\ y = \ln[x]$$

3) Provide definitions (mathematical expressions or equations where possible) for the following terms:

a) standard normal density function; b) cumulative normal distribution function;

c) cash and carry arbitrage; d) covered interest arbitrage; e) Value at risk;

f) Black-Scholes option pricing model; g) Geometric Brownian motion

h) fundamental partial differential equation for the Black-Scholes formula

4) i) Partially differentiate the function y with respect to the variable x, i.e., evaluate $\partial y / \partial x$:

$$a)\quad y[x,z] = x^2 z^4 \qquad\qquad b)\quad y[x,T] = \sum_{t=1}^{T} \frac{1}{\{1 + x\}^t}$$

ii) Partially differentiate the function $C[S, t]$, twice with respect to S and once with respect to t where $N[x]$ is the cumulative normal distribution function evaluated at x:

$$C[S,\ t] = S\ N[d_1] - X\ \exp[-rt^*]\ N[d_2]$$

$$where:\quad d_1 = \frac{\ln\left[\frac{S}{X}\right] - (r + ½\sigma^2)}{\sigma\sqrt{t^*}} \qquad d_2 = d_1 - \sigma\sqrt{t^*}$$