

SIMON FRASER UNIVERSITY
Faculty of Business Administration

BUS 417
Preliminary Mathematics/Statistics/Finance/Accounting Quiz

NOTE: This quiz is only for information purposes and will NOT be used as part of the examination component. However, failure to make a good faith effort in answering the questions may affect the participation component of the assessment.

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

a) Your name; b) The courses which were taken to satisfy the finance, mathematics and statistics prerequisites for this course; c) If these courses were not taken at SFU, indicate the school which you previously attended. If you are an SFU student indicate the instructor(s) who taught your finance, math and statistics prerequisite course(s).

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

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

c) $\sum_{i=1}^3 \sigma_i^2 X_i^2 + 2 \sum_{i=1}^3 \sum_{j=1; i \neq j}^3 X_i X_j \sigma_{ij} = \sum_{j=1}^3 \sum_{k=1}^3 X_j X_k \sigma_{jk}$

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

f) $\ln[1 + x]$ for x small (How small is small?)

2) **Calculus I:** Differentiate the function $y[x]$ with respect to the variable x , i.e., evaluate dy/dx :

a) $y = \frac{1}{\{1 + x\}^n}$ b) $y = \sum_{t=1}^T \frac{1}{\{1 + x\}^t}$

c) $y = \ln[x]$ d) $y = \frac{1}{x} - \frac{1}{x(1 + x)^T}$

3) **Calculus II:** Totally differentiate $y[x,z]$ where x and z are variables, and all other letters are parameters:

a) $y = ax^3 + bz^4$ b) $y = x^a z^b$ c) $y = f[u, x, z]$

4) **Real Analysis:** Provide definitions (mathematical expressions or equations where possible)
a) sequence and series b) geometric series c) uniform convergence d) Taylor series expansion

e) Simplify the following expressions by re-expressing the series as a ratio:

$$i) 1 + x + x^2 + x^3 + x^4 + \dots \quad \text{for } |x| < 1 \qquad ii) \sum_{t=1}^T \frac{1}{\{1 + r\}^t}$$

Use the answer for i) to solve for the price of a perpetuity

5) **Statistics:** Provide definitions (mathematical expressions or equations where possible) for the following terms:

- a) sample mean (average) b) sample variance c) sample covariance d) population mean
 e) expected value of the random variable X , $E[X]$ f) population standard deviation
 g) cumulative normal distribution function h) standard normal density function

6) **Finance:** Provide definitions (mathematical expressions or equations where possible):

- a) capital asset pricing model b) security market line c) bond duration d) bond convexity
 e) the delta of a call option f) the gamma of a put option g) the theta of a currency option

7) **Accounting:** Explain the difference between: a) accrual basis and cash basis accounting; b) percentage-of-completion and completed contracts method of revenue recognition; c) cash flow from operations and free cash flow; d) primary earnings per share and fully diluted earnings per share.

8) **Accounting:** Explain briefly how each of the following transactions would affect a company's balance sheet, income statement and cash flow statement: a) purchase of a new building for \$1 million internal cash; b) purchase of a new \$1 million building, financed 60% with debt and 40% with cash; c) receipt of a \$100,000 payment from a customer on an account receivable; d) repurchase of \$10 million in company stock using internal cash.