February 6, 2012

Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 2 (B)

Question 1. Find the value of the sum:

(a) *(3 marks)* $\sum_{j=-2}^{4} 2^{3-j}$ (write your answer as a fraction)

$= 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 + 2^{-1}$

$= 32 + 16 + 8 + 4 + 2 + 1 + \frac{1}{2}$

$= 63 + \frac{1}{2} = \frac{126}{2} + \frac{1}{2} = \frac{127}{2}$

(b) *(3 marks)* $\sum_{i=1}^{n} (i^2 + 3i + 4)$

$= \sum_{i=1}^{n} i^2 + 3\sum_{i=1}^{n} i + 4\sum_{i=1}^{n} 1$

$= \frac{n(n+1)(2n+1)}{6} + \frac{3n(n+1)}{2} + 4n$

Question 2. *(4 marks)* Find the following:

$$\int x^2\sqrt{2x-1}\,dx$$

LET $u = 2x - 1$

$du = 2dx$

$\frac{du}{2} = dx$

$u + 1 = 2x$

$\frac{u+1}{2} = x$

$= \int \left(\frac{u+1}{2}\right)^2 \sqrt{u}\,\frac{du}{2} = \frac{1}{8}\int (u+1)^2 u^{1/2}\,du$

$= \frac{1}{8}\int (u^2 + 2u + 1)u^{1/2}\,du = \frac{1}{8}\int \left(u^{5/2} + 2u^{3/2} + u^{1/2}\right)du$

$= \frac{1}{8}\left[\frac{u^{7/2}}{7/2} + \frac{2u^{5/2}}{5/2} + \frac{u^{3/2}}{3/2}\right] + C$

$= \frac{1}{28}u^{7/2} + \frac{1}{10}u^{5/2} + \frac{1}{12}u^{3/2} + C$

$= \frac{1}{28}(2x-1)^{7/2} + \frac{1}{10}(2x-1)^{5/2} + \frac{1}{12}(2x-1)^{3/2} + C$