

Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 2 (B)

Question 1. Find the following:

(b) (6 marks) $\int x^2 \sqrt{2x-1} dx$

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

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

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

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

$$\text{LET } u = 2x - 1$$

$$du = 2dx$$

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

$$\Rightarrow u+1 = 2x$$

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

(a) (4 marks) $\int \csc^2 x (\cot x - 1)^3 dx$

$$= \int \csc^2 x (u)^3 \frac{du}{-\csc^2 x} = - \int u^3 du$$

$$= -\frac{u^4}{4} + C = -\frac{(\cot x - 1)^4}{4} + C$$

$$\text{LET } u = \cot x - 1$$

$$du = -\csc^2 x dx$$

$$\frac{du}{-\csc^2 x} = dx$$