

Quiz 8

This quiz is graded out of 10 marks. No books, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. (2 marks) pg. 748 #7 Evaluate the following definite integral:

$$\int_3^6 \left(\frac{1}{\sqrt{x}} + 2 \right) dx = \int_3^6 x^{-\frac{1}{2}} + 2 dx = \left[2x^{\frac{1}{2}} + 2x \right]_3^6$$

$$= 2\sqrt{6} + 2(6) - 2\sqrt{3} - 2(3)$$

$$= 2\sqrt{6} - 2\sqrt{3} + 6$$

Question 2. (4 marks) pg. 841 #26 Evaluate the following definite integral:

$$\int_0^2 \frac{e^{2t}}{\sqrt{e^{2t}+4}} dt \stackrel{(1)}{=} \int_0^2 \frac{e^{2t}}{\sqrt{u}} dt$$

$$u \stackrel{(1)}{=} e^{2t} + 4 \quad \stackrel{(2)}{=} \int_5^{e^4+4} \frac{e^{2t}}{\sqrt{u}} \left(\frac{du}{2e^{2t}} \right)$$

$$\frac{du}{dt} = 2e^{2t} \quad \stackrel{(2)}{=} \int_5^{e^4+4} \frac{du}{\sqrt{u}} = \frac{1}{2} \int_5^{e^4+4} \frac{du}{\sqrt{u}} = \frac{1}{2} \left[2u^{1/2} \right]_5^{e^4+4}$$

$$u(0) = e^0 + 4 = 5$$

$$u(2) = e^4 + 4$$

$$= \sqrt{e^4+4} - \sqrt{5}$$

Question 3. (4 marks) pg. 837 #12 Evaluate the following definite integral:

$$\int_0^{\frac{\pi}{4}} \frac{\sec^2 x}{\sqrt{4 + \tan x}} dx \stackrel{(1)}{=} \int_0^{\frac{\pi}{4}} \frac{\sec^2 x}{\sqrt{u}} dx$$

$$u \stackrel{(1)}{=} 4 + \tan x \quad \stackrel{(2)}{=} \int_4^5 \frac{\sec^2 x}{\sqrt{u}} \left(\frac{du}{\sec^2 x} \right) = \left[2\sqrt{u} \right]_4^5$$

$$\frac{du}{dx} = \sec^2 x \quad \stackrel{(2)}{=} \int_4^5 \frac{du}{\sqrt{u}} = \left[2\sqrt{u} \right]_4^5$$

$$\frac{du}{\sec^2 x} = dx$$

$$= 2\sqrt{5} - 2\sqrt{4}$$

$$= 2\sqrt{5} - 4$$

$$u(0) = 4 + \tan 0 = 4$$

$$u\left(\frac{\pi}{4}\right) = 4 + \tan \frac{\pi}{4} = 5$$