Quiz #4

Question (10 points total)

(a) Evaluate the definite integral

$$\int_4^9 \frac{1-\sqrt{u}}{\sqrt{u}}\, du.$$

(b) Evaluate the integral

$$\int \frac{(1+\sqrt{x})^3}{\sqrt{x}}\, dx.$$

Solution:

(a)

$$\int_4^9 \frac{1-\sqrt{u}}{\sqrt{u}}\, du = \int_4^9 (u^{-\frac{1}{2}} - 1)\, du = \left[2\sqrt{u} - u\right]_4^9 = (2\sqrt{9} - 9) - (2\sqrt{4} - 4) = -3.$$

(b) Let $u = 1 + \sqrt{x}$, then $du = \frac{1}{2\sqrt{x}}$ and so $2du = \frac{1}{sqrtx}\, dx$. Thus

$$\int \frac{(1+\sqrt{x})^3}{\sqrt{x}}\, dx = \int u^3\, 2du = 2\left(\frac{1}{4}u^4\right) + C = \frac{1}{2}(1+\sqrt{x})^4 + C.$$

Note: Points will be deducted for incomplete or incorrect answers. Points will also be deducted for not fully or properly showing your work.