Module 4 self assessment

Question 1

Let c be the path consisting of the straight line from $(0,0)$ to $(5\sqrt{2},0)$ followed by the arc from $(5\sqrt{2},0)$ to $(0,5\sqrt{2})$ that is part of the circle of radius $5\sqrt{2}$ centred at the origin. Compute the work integral

$$\int_c \mathbf{F}\cdot \mathrm{d}\mathbf{r},$$

(i) for the field $\mathbf{F} = x\hat{\mathbf{i}} + y\hat{\mathbf{j}}$, and (ii) $\mathbf{F} = x\hat{\mathbf{j}}$.

Question 2

If $\mathbf{A} = (2y+3)\hat{\mathbf{i}} + xz\hat{\mathbf{j}} + (yz-x)\hat{\mathbf{k}}$, evaluate $\int_c \mathbf{A}\cdot \mathrm{d}\mathbf{r}$ along c if this is made of the straight lines from (0,0,0) to (0,0,1), then to (0,1,1) and ending at (2,1,1).