INTEGRALS OF VECTOR-VALUED FUNCTONS

For each vector-valued function $\vec{r}(t)$ below, find $\int \vec{r}(t)\,dt$.

1. $\vec{r}(t) = t\hat{i} + t^2\hat{j} + \frac{1}{t}\hat{k}$

2. $\vec{r}(t) = (t+1)\hat{i} + (t^2+1)\hat{j} + (t^3+1)\hat{k}$

3. $\vec{r}(t) = (e^t+1)\hat{i} + (e^{2t}+1)\hat{j} + (te^{t^2}+1)\hat{k}$

4. $\vec{r}(t) = \cos 2t\,\hat{i} + \sin 2t\,\hat{j} + t\,\hat{k}$

5. $\vec{r}(t) = \sqrt{t}\hat{i} + e^{3t}\hat{j} + \ln(t)\hat{k}$

6. $\vec{r}(t) = \cos(t)\hat{i} + \sin(t)\hat{j} + \tan(t)\hat{k}$

7. $\vec{r}(t) = \frac{t}{1+t^2}\hat{i} + \sec(t)\hat{j} + \frac{e^t - e^{-t}}{2}\hat{k}$

8. $\vec{r}(t) = \cos^2(t)\hat{i} + \sin^2(t)\hat{j} + \sec^2(t)\hat{k}$