Calculus II
Ver 2

Name:______________________________
Student ID:__________________________

Quiz 7

May. 16, 2007

Given that

$$\mathbf{r}(t) = < t^3 - t, 0, e^{3t} >,$$

calculate

- (5 pts)

$$\lim_{t\to 0} \mathbf{r}(t) = ?$$

$$\lim_{t\to 0} \vec{r}(t) = < \lim_{t\to 0} (t^3 - t), \lim_{t\to 0} 0, \lim_{t\to 0} e^{3t} >$$
$$= < 0, 0, e^0 >$$
$$= < 0, 0, 1 >$$

- (5 pts)

$$\frac{d}{dt}\mathbf{r}(t) = ?$$

$$\frac{d}{dt}\vec{r}(t) = < \frac{d}{dt}(t^3 - t), \frac{d}{dt} 0, \frac{d}{dt} e^{3t} >$$
$$= < 3t^2 - 1, 0, 3e^{3t} >$$

- (5 pts)

$$\int \mathbf{r}(t)\, dt = ?$$

$$\int \vec{r}(t)\, dt = < \int t^3 - t\, dt, \int 0\, dt, \int e^{3t} dt >$$
$$= < \frac{1}{4}t^4 - \frac{1}{2}t^2 + C_1, C_2, \frac{1}{3}e^{3t} + C_3 >$$
$$\text{or} \quad = < \frac{1}{4}t^4 - \frac{1}{2}t^2, 0, \frac{1}{3}e^{3t} > + \vec{C}$$

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- (5 pts)

$$\int_0^1 \mathbf{r}(t)\, dt = ?$$

$$\int_0^1 \vec{r}(t)\, dt = < \int_0^1 t^3 - t\, dt, \int_0^1 0\, dt, \int_0^1 e^{3t} dt >$$
$$= < \frac{1}{4}t^4 - \frac{1}{2}t^2 \Big|_0^1, 0 \Big|_0^1, \frac{1}{3}e^{3t} \Big|_0^1 >$$
$$= < -\frac{1}{4}, 0, \frac{1}{3}e^3 - \frac{1}{3} >$$

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