Math 2471 Calc 3 - Homework #1

Pg. 825-826, #11, 23, 25, 31, 35, 65, 67, 71, 72 and 73

Pg. 834, #11, 13, 17, 19, 23, 39, 47 and 53

Pg. 825-826

#11 Evaluate the given vector function at each given value of t

$$\vec{r}(t) = \frac{1}{2}t^2\,\vec{i} - (t-1)\,\vec{j}$$

(a) $\vec{r}(1)$ (b) $\vec{r}(0)$ (c) $\vec{r}(s+1)$ (d) $\vec{r}(2+\Delta t) - \vec{r}(2)$

Sketch the following plane curve/space curve of the following giving the vector functions orientation (direction)

$$\#23 \quad \vec{r}(t) = \frac{t}{4}\,\vec{i} - (t-1)\,\vec{j}$$

$$\#25 \quad \vec{r} = <t^3, t^2>$$

$$\#31 \quad \vec{r}(t) = (-t+1)\,\vec{i} + (4t+2)\,\vec{j} + (2t+3)\,\vec{k}$$

$$\#35 \quad \vec{r}(t) = <2\sin t, 2\cos t, e^{-t}>$$

Find the following limit

$$\#65 \quad \lim_{t \to \pi}(t\,\vec{i} + \cos t\,\vec{j} + \sin t\,\vec{k})$$

$$\#67 \quad \lim_{t \to 0}\left\langle t^2, 3t, \frac{1-\cos t}{t}\right\rangle$$

Determine the interval(s) on which the following are continuous

$$\#71 \quad \vec{r}(t) = \frac{1}{2t+1}\,\vec{i} + \frac{1}{t}\,\vec{j}$$

$$\#72 \quad \vec{r}(t) = <\sqrt{t}, \sqrt{t-1}>$$

$$\#73 \quad \vec{r}(t) = <t, \arcsin t, t-1>$$

Pg. 834

Find the derivative of the following:

$$\#11 \quad \vec{r}(t) = t^4\,\vec{i} - 5t\,\vec{j}$$

$$\#13 \quad \vec{r}(t) = 3\cos^3 t\,\vec{i} + 2\sin^3 t\,\vec{j} + \vec{k}$$

$$\#17 \quad \vec{r}(t) = <t\sin t, t\cos t, t>$$

Find (a) $\vec{r}'(t)$ (b) $\vec{r}''(t)$ (c) $\vec{r}'(t) \cdot \vec{r}''(t)$ (d) $\vec{r}'(t) \times \vec{r}''(t)\,(23\ only)$ for

$$\#19 \quad \vec{r}(t) = t^3\,\vec{i} + \frac{1}{2}t^2\,\vec{j}$$

$$\#23 \quad \vec{r}(t) = \frac{1}{2}t^2\,\vec{i} - t\,\vec{j} + +\frac{1}{6}t^3\,\vec{k}$$

Find the following integrals:

$$\#39 \quad \int (2t\,\vec{i} + \vec{j} + 9\,\vec{k})\,dt$$

$$\#47 \quad \int_0^1 (8t\,\vec{i} + t\,\vec{j} - \vec{k})\,dt$$

#53 Find the antiderivative of the following:

$$\vec{r}'(t) = <4e^{2t}, 3e^t> \qquad \vec{r}(0) = <2,0>$$

Due: Tuesday June 14, 2022