MA 213 Worksheet #7

Sections 13.2
1/31/19

1 *13.2.9, 11* Find the derivative of the following vector functions:

(a) $\mathbf{r}(t) = \langle \sqrt{t-2}, 3, 1/t^2 \rangle$

(b) $\mathbf{r}(t) = t^2\mathbf{i} + \cos(t^2)\mathbf{j} + \sin^2(t)\mathbf{k}$

2 *13.2.17* Find the unit tangent vector $T(t)$ at the point $t = 2$: $\mathbf{r}(t) = \langle t^2 - 2t, 1 + 3t, 1/3t^3 + 1/2t^2 \rangle$.

3 *13.2.23* Find the parametic equation for the tangent line to the curve given by the following parametric equations at the specified point:

$$x = t^2 + 1, \quad y = 4\sqrt{t}, \quad z = e^{t^2 - t}; \quad (2, 4, 1).$$

4 *13.2.27* Find a vector equation for the tangent line to the curve of intersection of the cylinders $x^2 + y^2 = 25$ and $y^2 + z^2 = 20$ at the point $(3, 4, 2)$.

5 *13.2.35, 37* Evaluate the integral:

(a) $\displaystyle\int_0^2 \Big(t\mathbf{i} - t^3\mathbf{j} + 3t^5\mathbf{k}\Big)\,dt$

(b) $\displaystyle\int_0^1 \Big(\frac{1}{t+1}\mathbf{i} + \frac{1}{t^2+1}\mathbf{j} + \frac{t}{t^2+1}\mathbf{k}\Big)\,dt$

6 *13.2.41* Find $\mathbf{r}(t)$ if $\mathbf{r}'(t) = 2t\mathbf{i} + 3t^2\mathbf{j} + \sqrt{t}\mathbf{k}$ and $\mathbf{r}(1) = \mathbf{i} + \mathbf{j}$.

7 *13.2.49* Find $f'(2)$, where $f(t) = u(t) \cdot v(t)$, $u(2) = \langle 1, 2, -1 \rangle$, $u'(2) = \langle 3, 0, 4 \rangle$ and $v(t) = \langle t, t^2, t^3 \rangle$.

8 *13.2.54* Find an expression for $\dfrac{d}{dt}[\mathbf{u}(t) \cdot (\mathbf{v}(t) \times \mathbf{w}(t))]$.