SM223 – Calculus III with Optimization Fall 2017
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Review Quiz 2

Instructions. You have 20 minutes to complete this review quiz. You may use your calculator. You may not use any other materials. Put your answers on the separate answer form provided.

1. The tangent vector to the curve $\vec{r}(t) = \langle 2t, \sin t, \cos t \rangle$ at $t = \pi$ is:

   (a) $(2\pi, -\pi, 0)$
   (b) $(2, -1, 0)$
   (c) $(2, 0, 1)$
   (d) $(2\pi, 0, 1)$
   (e) $(2\pi, -1, 0)$

2. What is $\vec{r}(1)$, given $\vec{r}\,'(t) = t^2\vec{i} + t^3\vec{j}$ and the initial condition $\vec{r}(0) = \vec{i}$?

   (a) $\frac{1}{3}\vec{i} + \frac{1}{4}\vec{j}$
   (b) $\frac{4}{3}\vec{i} + \frac{1}{4}\vec{j}$
   (c) $\frac{2}{3}\vec{i} + \frac{1}{4}\vec{j}$
   (d) $\frac{4}{3}\vec{i} + \frac{3}{4}\vec{j}$
   (e) $\frac{1}{3}\vec{i} + \frac{3}{4}\vec{j}$

3. Which one of the listed vector-valued functions defines a circle?

   (a) $\vec{r}(t) = \langle 3\cos(2t), 3\sin(2t), 4 \rangle$
   (b) $\vec{r}(t) = \langle 3\cos(2t), 4\sin(2t), 0 \rangle$
   (c) $\vec{r}(t) = \langle 3\cos(t), 3\sin(t), 4t \rangle$
   (d) $\vec{r}(t) = \langle 3\cos(t), 4\sin(t), 0 \rangle$
   (e) $\vec{r}(t) = \langle 3\cos^2(t), 3\sin^2(t), 4t \rangle$

4. The two lines

   $$\vec{r}_1(t) = \langle 1 + 4t, 2 + 5t, 3 + 6t \rangle \quad \text{and} \quad \vec{r}_2(t) = \langle -6 + 7t, -6 + 8t, -6 + 9t \rangle$$

   intersect at the point $(1, 2, 3)$. Which one of the listed vectors is perpendicular to the plane that contains both lines?

   (a) $\langle 1, 2, 3 \rangle \times \langle -6, -6, -6 \rangle$
   (b) $\langle 1, 2, 3 \rangle \times \langle 7, 8, 9 \rangle$
   (c) $\langle 4, 5, 6 \rangle \times \langle -6, -6, -6 \rangle$
   (d) $\langle 1, 2, 3 \rangle \times \langle 4, 5, 6 \rangle$
   (e) $\langle 4, 5, 6 \rangle \times \langle 7, 8, 9 \rangle$

5. Find the length of the curve $\vec{r}(t) = \langle \sin(t), \cos(t), t\sqrt{3} \rangle$ from $t = 0$ to $t = 10$.

   (a) $10 + 50\sqrt{t}$
   (b) $\cos(10) + \sin(10) + 10\sqrt{3}$
   (c) $10 + 10\sqrt{3}$
   (d) 10
   (e) 20