MATH 233 SECTION 1 ATTENDANCE PROBLEMS

These are the quick problems given in class to (randomly) take attendance.

(1) Let $\mathbf{v} = \langle 1, 1, 1\rangle, \mathbf{w} = \langle 1, 0, -1\rangle$.
   (a) Compute $\mathbf{v} \cdot \mathbf{w}$. **Answer:** 0.
   (b) Is $\mathbf{v} \perp \mathbf{w}$? **Answer:** Yes. Since both aren't 0 and the dot product is 0, they are perpendicular.

(2) Let $\mathbf{v} = \langle 0, 1, -1\rangle, \mathbf{w} = \langle -1, 0, 1\rangle$. Compute $\mathbf{v} \times \mathbf{w}$. **Answer:** $\mathbf{v} \times \mathbf{w} = \langle 1, 1, 1\rangle$. You can check that $\mathbf{v} \cdot (\mathbf{v} \times \mathbf{w}) = \mathbf{w} \cdot (\mathbf{v} \times \mathbf{w}) = 0$.

(3) Find $\mathbf{r}(t)$ if $\mathbf{r}'(t) = \langle t, t^2, t^3\rangle$ and $\mathbf{r}(0) = \langle 1, 1, 1\rangle$. **Answer:** Integrate to get $\mathbf{r}(t) = \langle t^2/2, t^3/3, t^4/4\rangle + \mathbf{c}$. Then since $\mathbf{r}(0) = \langle 1, 1, 1\rangle$ we get $\mathbf{c} = \langle 1, 1, 1\rangle$ and the answer is $\langle t^2/2 + 1, t^3/3 + 1, t^4/4 + 1\rangle$

(4) Let $\mathbf{r}(t) = \langle t + 1, 4t + 1, 8t + 1\rangle$. Find the arc length from $t = 0$ to $t = 1$. **Answer:** We need to compute

$$\int_0^1 |\mathbf{r}'(t)|\, dt.$$

We find $|\mathbf{r}'(t)| = 9$, so after integration we get 9.

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