

MATH 210, Fall 2009
Sample exam problems for the 1st hour exam
Choose one Xa or Xb for each X=1,2,3,4,5

1a. Let $\vec{u} = \langle 1, 0, -2 \rangle$ and $\vec{w} = \langle 1, 2, 3 \rangle$. Compute

(a) $\vec{u} - 2\vec{w}$

(b) $\vec{u} \cdot \vec{w}$

(c) $\vec{u} \times \vec{w}$

(d) $\|\vec{u}\|$

1b. same with $\vec{u} = \langle 1, -1, 2 \rangle$ and $\vec{w} = \langle 2, 1, 3 \rangle$.

2a. Find an equation of the plane through the points

$$A = (1, 0, 1), \quad B = (3, -1, 2), \quad C = (2, 3, 0).$$

2b. Find an equation of the line through $A = (1, 2, 3)$ and perpendicular to

$$\vec{u} = \langle 1, -1, 1 \rangle \quad \text{and} \quad \vec{w} = \langle 1, 0, 2 \rangle.$$

3a. Find the arclength of the path $\vec{r}(t) = \langle 3 \sin(t), 5 \cos(t), 4 \sin(t) \rangle$ where $0 \leq t \leq \pi$.

3b. Find the arclength of the path $\vec{r}(t) = \langle 2 \sin(t), 2 \cos(t), 3t \rangle$ where $0 \leq t \leq 1$.

4a. Consider the curve $\vec{r}(t) = \langle e^{2t}, t^2, \cos(t) \rangle$. Find $\vec{r}(t)'$ and $\vec{r}(t)''$ and compute the curvature κ at $t = 0$ of the curve (start by writing the formula you are using).

4b. Consider the curve $\vec{r}(t) = \sin(t)\vec{i} + e^t\vec{j} + t^2\vec{k}$. Find $\vec{r}(t)'$ and $\vec{r}(t)''$ and compute the curvature κ at $t = 0$ of the curve (start by writing the formula you are using).

5a. Find the partial derivatives $\frac{\partial f}{\partial x}$, $\frac{\partial f}{\partial y}$ and $\frac{\partial^2 f}{\partial x \partial y}$ for the function $f(x, y) = e^{2x-y} \sin(xy)$.

5b. Find the partial derivatives $\frac{\partial^2 f}{\partial x^2}$ and $\frac{\partial^2 f}{\partial y^2}$ for the function $f(x, y) = e^{xy} \sin(y^3 + 1)$.