

Calculus II F'16
Exam 3

Name: _____

Make sure to show your work (answers without supporting work will receive no credit). Do not use a crib sheet, calculator, phone, etc.

1. Find an equation for the line tangent to the curve $x = t^3$, $y = 1 + t^4$ at $t = 3$.

2. Find an equation of the line that goes through $(1, -1, 2)$ and $(-1, 1, 1)$.

3. Let $\mathbf{u} = \langle 1, 2, 0 \rangle$ and $\mathbf{v} = \langle 3, 0, -1 \rangle$.
- Find the angle between \mathbf{u} and \mathbf{v} .

- Find a nonzero vector \mathbf{w} that is orthogonal to \mathbf{u} and \mathbf{v} .

c) Find $\text{proj}_{\mathbf{v}} \mathbf{u}$

4. The acceleration is $\mathbf{a}(t) = -2\mathbf{i} + e^{3t}\mathbf{k}$, the initial velocity is $\mathbf{v}(0) = \mathbf{0}$ and the initial position is $\mathbf{r}(0) = \mathbf{i}$.

a) Find the velocity $\mathbf{v}(t)$.

b) Find the position $\mathbf{r}(t)$.

5. Let $g(r, s, t) = 3rt^2 + \cos(2st)$.

a) Find $\frac{\partial g}{\partial r}$

b) Find $\frac{\partial g}{\partial s}$

c) Find $\frac{\partial^2 g}{\partial t \partial r}$

Workspace