

## PROBLEM SET 4

MATH 2019 – SPRING 2008

- (a) Find the distance between the point  $(3, 2, 1)$  and the plane  $x - y + 2z = 4$   
(b) Find the distance between the point  $(1, 2, 3)$  and the line  $x - 2 = \frac{y - 2}{-3} = \frac{z}{5}$   
(c) Explain how you would find the distance between two parallel planes.  
How about the distance between two parallel lines?

2. Evaluate the limit.

- (a)  $\lim_{t \rightarrow 0} \left( \frac{e^t - 1}{t} \mathbf{i} + \frac{\sqrt{1-t} - 1}{t} \mathbf{j} + \cos(\pi - t) \mathbf{k} \right)$   
(b)  $\lim_{t \rightarrow \infty} \left( e^{-2t} \mathbf{i} + \frac{1}{t} \mathbf{j} + \frac{\sqrt{3t^2 + t + 1}}{2t + 5} \mathbf{k} \right)$

3. Find  $\mathbf{r}(t)$  for the given conditions.

- (a)  $\mathbf{r}''(t) = 25e^{-5t} \mathbf{i} + 12t \mathbf{j} - 16 \cos 2t \mathbf{k}$   
 $\mathbf{r}'(0) = 3\mathbf{j} - 4\mathbf{k}$   
 $\mathbf{r}(0) = 3\mathbf{i} + 2\mathbf{j} - 5\mathbf{k}$

- (b)  $\mathbf{r}'(t) = \frac{t}{4t^2 + 1} \mathbf{i} + 3 \sin t \cos^2 t \mathbf{j} + \sqrt[3]{t} \mathbf{k}$   
 $\mathbf{r}(0) = \mathbf{i} - \mathbf{j} + \mathbf{k}$

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