

EXAM 1
Math 232
August 6, 2008

Name _____

1. Let $\vec{a} = \langle 1, 1, -3 \rangle$, $\vec{b} = \langle -3, 1, 2 \rangle$ and $\vec{c} = \langle -2, 0, -3 \rangle$. Find:

(a) $(2\vec{a} - \vec{c}) \cdot \vec{b}$

(b) $\vec{a} \times \vec{b}$

(c) The vector of magnitude 2 that points in the same direction as \vec{b} .

(d) The angle between \vec{b} and \vec{c} .

2. A constant force of $\langle 50, -20 \rangle$ pounds moves an object in a straight line from the point $(1, 5)$ to the point $(13, -10)$. Compute the amount of work done.

3. Are the lines defined by

$$\begin{cases} x=1-2t \\ y=2t \\ z=5-t \end{cases} \quad \text{and} \quad \begin{cases} x=3+2s \\ y=-2 \\ z=-3+2s \end{cases}$$

parallel? Perpendicular? Do they intersect? If not parallel what is the angle between the two lines?

4. Write the equation of the plane which contains the the point $(3, 1, 0)$ and has a normal vector $\langle 2, -1, 5 \rangle$.

5. A paperboy is riding at 12 ft/s on a bicycle and tosses a paper over his left shoulder at 48 ft/s. If the porch is 40 ft off the road, how far up the street should the paperboy release the paper to hit the porch?

6. Find the intersection of the planes $x + y - 3z = 4$ and $3x - y + z = 0$.

7. Write the equation of the plane which contains the points $(1, 0, -1)$, $(-1, 2, 3)$ and $(2, 1, 1)$.
Now determine whether the plane you just found is perpendicular to the plane $7 = 2x - 3y + z$

8. Find all values of t for which $\vec{r}(t) = \langle \sqrt{t^2 + 1}, \cos(t), e^{-3t} \rangle$ is a continuous function. Now find $\vec{r}'(t)$.

9. Find $\lim_{t \rightarrow 1} \left\langle \sqrt{t-1}, t^2 + 3, \frac{t+1}{t-1} \right\rangle$ if the limit exists. If it does not exist explain why not.

10. Find $\int_0^2 \left\langle \frac{4}{t+1}, e^{t-2}, te^t \right\rangle dt$

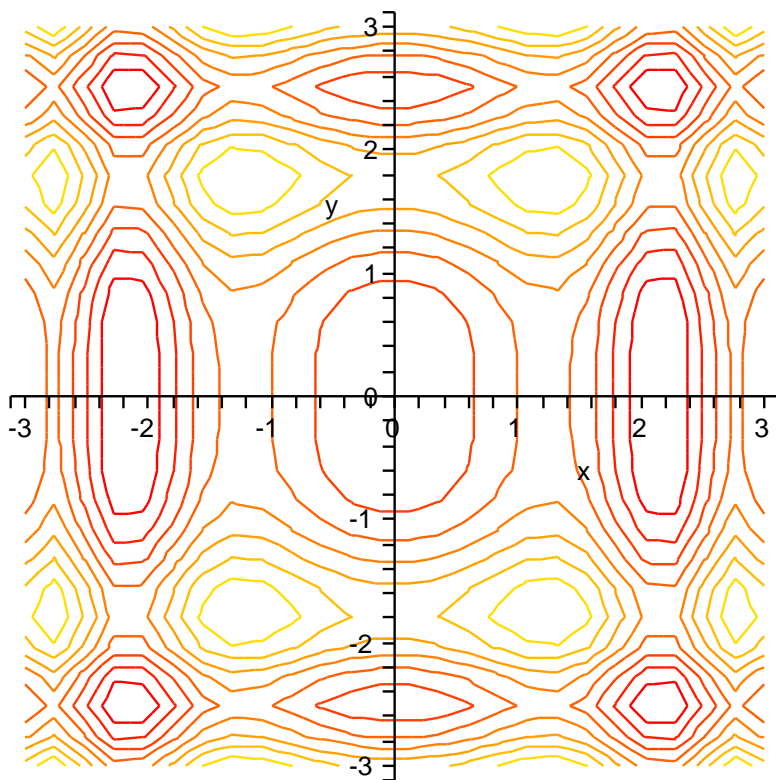
11. Find the horizontal range and the speed at impact of an object which is launched at an initial speed of 120 feet per second, 5 feet above the ground, at an angle of $\frac{\pi}{6}$ radians above the horizontal. (Assume the only force acting on the object is gravity.)

12. Show that $\lim_{(x,y) \rightarrow (0,0)} \frac{y \sin(x)}{x^2 + y^2}$ does not exist.

13. Determine all the points at which $f(x, y) = \ln(3 - x^2 + y)$ is continuous.

14. Which of the following functions would produce the contourplot produced below? (5 pts)

- (a) $f(x, y) = 2x - 3y + 8$
- (b) $f(x, y) = e^{(-x^2+y)} + 10$
- (c) $f(x, y) = x^2 - y^2 - 3$
- (d) $f(x, y) = xy - 2x - y$
- (e) $f(x, y) = \sin(x^2) - \cos(y^2)$



15. Match the equations $f(x, y) = x + y - 1$,
 $f(x, y) = z = xy e^{-(x^2+y^2)}$,
 $f(x, y) = x^3 - \sin(y)$ and
 $f(x, y) = \cos(xy)$
to the correct graphs below.

