

Math 233 Warm Up Problems

September 17, 2009

1. Let $f(x, y, z) = x^3yz$ and $r(t) = (t, t^2, \cos t)$.

(a) Let $g(t) = f(r(t))$. Find

$$g(t) =$$

(b)

$$g'(t) =$$

2. Let $f(t) = \sin t$ and $g(x, y, z) = x^2 + yz$.

(a) Let $h(x, y, z) = f(g(x, y, z))$.

$$h(x, y, z) =$$

(b)

$$\nabla h(x, y, z) =$$

Lecture Problems

3. Let $f(x, y) = x + 2y$. Draw level sets for f and graph the gradient vector field of f , ∇f .

4. Let $f(x, y) = x - y^2$. Draw level sets for f and graph the gradient vector field of f , ∇f .

5. Let

$$f(x, y, z) = x + y^2 + z^3$$

$$r(t) = (\sin t, \cos t, t)$$

$$(f \circ r)'(t) =$$

6. Suppose $f(x, y, z) = \frac{x^3y}{z+1}$ and you also know that

$$r(1) = (2, 3, 1) \quad r'(1) = (-1, 1, -2)$$

Find

$$(f \circ r)'(1) =$$