MATH 253   Spring 2003   Section 501
Maple Quiz Solutions
```
> restart:with(VecCalc):VCalias:
```
#1
```
> f:=MF(<x,y>,x^2*y^4);
```
$$f := (x, y) \rightarrow x^2 y^4$$
```
> fx:=D[1](f);
```
$$fx := (x, y) \rightarrow 2 x y^4$$
```
> fy:=D[2](f);
```
$$fy := (x, y) \rightarrow 4 x^2 y^3$$
```
> P:=<2,1>;
```
$$P := \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$
```
> X:=<x,y>;
```
$$X := \begin{bmatrix} x \\ y \end{bmatrix}$$
```
> fP:=f &@ P;
```
$$fP := 4$$
```
> fxP:=fx &@ P;
```
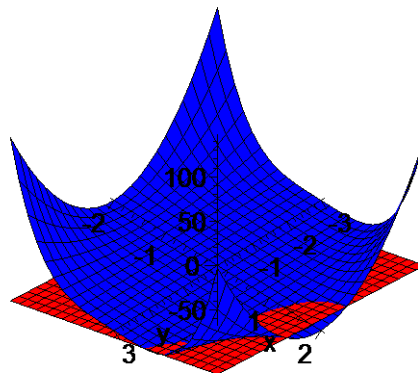$$fxP := 4$$
```
> fyP:=fy &@ P;
```
$$fyP := 16$$
```
> ftan:=MF(<x,y>,fP+fxP*(x-2)+fyP*(y-1));
```
$$ftan := (x, y) \rightarrow -20 + 4 x + 16 y$$
```
> pf:=plot3d(f(x,y), x=-3..3, y=-2..2, color=blue):
> pftan:=plot3d(ftan(x,y), x=-3..3, y=-2..2, color=red):
> display(pf,pftan, axes=normal);
```

[#2

> `z0:=rho*cos(phi);`

$$z0 := \rho \cos(\phi)$$

> `J:=rho^2*sin(phi);`

$$J := \rho^2 \sin(\phi)$$

> `M:=Muint(z0*J, rho=0..2, theta=0..2*Pi, phi=0..Pi/2); M:=value(%);`

$$M := \int_0^{\frac{\pi}{2}} \int_0^{2\pi} \int_0^2 \rho^3 \cos(\phi) \sin(\phi) \, d\rho \, d\theta \, d\phi$$

$$M := 4\pi$$

> `Mz:=Muint(z0^2*J, rho=0..2, theta=0..2*Pi, phi=0..Pi/2);`
  `Mz:=value(%);`

$$Mz := \int_0^{\frac{\pi}{2}} \int_0^{2\pi} \int_0^2 \rho^4 \cos(\phi)^2 \sin(\phi) \, d\rho \, d\theta \, d\phi$$

$$Mz := \frac{64\pi}{15}$$

> `zbar:=Mz/M;`

$$zbar := \frac{16}{15}$$

>