1. Sketch the level curves $z = 0, 7, 12$ and 16 for $z = 16 - x^2 - y^2$.
2. Find the limit of $f(x,y) = x^3 - 5x^2 + xy + \cos y$ as $(x,y) \to (2,0)$.
3. Find the limit of $f(x,y) = \dfrac{y^2 - xy^3}{1 - x^2}$ as $(x,y) \to (1,3)$.
4. Evaluate $\lim_{(x,y)\to(1,4)} e^{\sqrt{x+2y}}$.
5. Use polar coordinates to evaluate the limit $\lim_{(x,y)\to(0,0)} \dfrac{2xy}{x^2+y^2}$.
6. Find the set of points where the function $f(x,y) = \dfrac{y^2 - x^2 + 1}{4 - x^2 - y^2}$ is not continuous.
7. Find the first order partial derivatives $f_x,\ f_y,\ g_x$ and g_y for $f(x,y) = xy^4 - 2x^2y^3 + x$ and $g(x,y) = \ln\left(\sin x + e^{xy^2}\right)$.
8. Find the second order partial derivatives $f_{xx},\ f_{xy}$ and f_{yy} for $f(x,y) = \left(x^2 + y^3\right)^{3/2}$.
9. Find $f_x\left(\dfrac{\pi}{2}, \dfrac{\pi}{4}, \pi\right)$ if $f(x,y,z) = 2x + 3x\cos(z - y)$.
10. Find $\nabla f(2,1)$ if $f(a,b) = x^3 - ey + x^3y^3$.
11. Find the gradient $\nabla f(x,y)$ if $f(x,y) = yx^2 + \ln(xy)$.
12. Find $\nabla f(0,1)$ if $f(x,y) = e^{xy} + y^3 \sin(xy)$.
13. Use chain rule to determine $\dfrac{dz}{dt}$ where $z = \cos(yx),\ x = t^4 - 2t,\ y = 1 - t^3$.
14. Use chain rule to find the partial derivative f_u where $f = f(x,y),\ x = u^2 + 2v,\ y = uv$.
15. Let $f(x,y,z) = x^4 - 2x^2y + z^3,\ x = t^2,\ y = e^{3t},\ z = \dfrac{1}{t}$. Find $\dfrac{df}{dt}$ by using the Chain rule.
16. Find the directional derivatives of the following functions in the direction of given vectors at the given points:
    a) $f(x,y) = \sin(x - y)$, $\vec{v} = \langle 1, 1\rangle$, $P = (\frac{\pi}{2}, \frac{\pi}{6})$.
    b) $g(x,y,z) = x\ln(y + z)$, $\vec{v} = 2i - j + k$, $P = (2, e, e)$.
17. Find the directional derivative of $f(x,y,z) = 2xy^2 - xz^2 + yz$ at $(1,0,2)$ in the direction of $\vec{v} = \langle -1, 2, 2\rangle$.
18. Find the maximum rate of change of the function $f(x,y) = e^{2xy}$ at the point $(0,3)$ and the direction in which this maximum rate of change occurs.
19. Find an equation of the tangent plane to the surface $z = xy$ at $(-1, 2, -2)$.
20. Find an equation of the tangent plane to the surface $z = x^2 + 4y^2$ at the point $(2,1,8)$.
21. Find an equation for the tangent plane to the surface given by $z = \cos(x + y) + x$, at the point $P = (1, -1, 0)$.