Department of Mathematics
MAL 110 (Mathematics I)
Tutorial Sheet No. 3
Several Variables, Maxima/Minima and Euler's Theorem
Answers and Hints

1. (a) $x^2 + y^2 \leq 4$

   (b) $x^2 + y^2 > 9$

2. (a) 2

   (b) 0

   (c) 0

4. Take $y = mx^2$

5. (a) 6

   (b) 8

6. (a) $0, 0$

   (b) $6, 3$

   (c) $1, 1, 0$

7. (a) $(1 + \pi)dx + dy$

   (b) $dx + dy + dz$

8. $0.8 - 0.2e^{-1}$

9. 4.982

10. (a) 0 degree

    (b) 0 degree

11. Use Euler's Theorem

16. $\frac{4}{3}$

17. $\pm(\sqrt{a^2 + b^2 + c^2})$

20. $\left\{ (2n + 4k + 1)\frac{\pi}{10}, (2n - k + 1)\frac{\pi}{5} \right\}$ where n and k are integers

21. (a) $(0,0)$ is the point of maxima   (b) $(0,0)$ is the point of local minima

22. $f(x,y) = 6 - 4(x+1) + 4(y-2) + 2(x+1)^2 - 2(x+1)(y-2) + (x+1)^2(y-2)$

23. 0.6854