1M01 Mathematical Methods 2010–11
Calculus tutorial exercise sheet 2

1. For which values of x are the following functions defined? $\boxed{\text{Notes: 11–12}}$
   Briefly explain how you know that your answers are correct.

   (a) $f(x) = 2 - x^2$ (b) $g(x) = x + \sqrt{x}$ (c) $h(x) = \dfrac{x-1}{x^2 + 4x}$

2. (a) Find the slope-intercept equation of the straight line which passes $\boxed{\text{Notes: 16–18}}$
      through $(0,3)$ and has the same slope as $y = -0.5x$.

   (b) Find the slope-intercept equation of the straight line which passes
      through $(6,9)$ and has the same slope as $y = 2x$.

   (c) Find an equation for the straight line passing through the points
      $(3,-4)$ and $(-1,2)$.

3. The average mass of an adult primate's brain is thought to be directly $\boxed{\text{Notes: 16}}$
   proportional to the primate's skin surface area. An adult human typi-
   cally has a brain mass of 1.3kg and a skin surface area of 1.7m^2.

   Find a formula which expresses primate brain mass in terms of skin
   surface area, and use it to estimate the brain mass of a Taiwan monkey
   with a skin surface area of 0.4m^2.

4. Consider the function $f(x) = -x^2 + 5x - 2$.

   (a) For which x-values is this function defined? $\boxed{\text{Notes: 11–12, 21}}$

   (b) Solve the equation $f(x) = 0$. $\boxed{\text{Notes: 19–20}}$

   (c) Make a nice big sketch of the graph $y = f(x)$ for $-1 \le x \le 5$. $\boxed{\text{Notes: 13–14, 19}}$

   (d) Add the graph of $y = x$ to your sketch, and use this to estimate $\boxed{\text{Notes: 13, 15–16}}$
      the values of x for which $f(x) \ge x$.