B

5. For $f(x) = x^2 - 6x + 5$, find
   (a) the missing coordinate in $(x, ?)$
   (b) the slope of the tangent where $x = 3$
   (c) the equation of the tangent in (b)

6. **Knowledge and Understanding:** For $y = x^2 + 8x - 6$, determine $\frac{dy}{dx}$ from first principles.

7. Find the equation of the tangent for each given x-value.
   (a) $y = x^2 + x - 3$, where $x = 4$
   (b) $y = 2x^2 - 7$, where $x = -2$
   (c) $f(x) = 3x^2 + 2x - 5$, where $x = -1$
   (d) $f(x) = 5x^2 - 8x + 3$, where $x = 1$
   (e) $y = x^2 + 8x + 12$, where $x = -4$
   (f) $f(x) = x^3 + 3x^2 - 2x + 4$, where $x = 1$

8. (a) Find the equation of the tangent to the curve of $y = x^2 - 4x + 3$, where $x = 1$.
   (b) Sketch the graph of the function and the tangent.

9. For $f(x) = x^2 - 4x + 1$, find
   (a) the coordinates of point A, where $x = 3$, and of point B, where $x = 5$
   (b) the equation of the secant AB
   (c) the equation of the tangent at A
   (d) the equation of the tangent at B

10. For $f(x) = 2x^2 - 3x - 5$, find $f(3)$ and $f'(3)$. Explain in words and with a diagram the meaning of the value and the derivative function.

11. **Communication:** If a function is not differentiable at $x = a$, what does this mean
   (a) algebraically? (b) graphically?

12. A plane takes off from an airport. The table gives the plane's distance in kilometres from the airport at various times.

Time (h)	0	1	2	3	4	5	6
Distance (km)	0	300	800	1500	2300	2900	3300

   (a) What is the average rate of change of distance with respect to time over the first four hours?
   (b) Determine a possible algebraic model for the data.
   (c) Use your model to estimate the speed of the plane at 3 h after take-off.

13. A tank holds 500 L of liquid, which
the bottom of the tank. The volume,
t minutes is

$$V(t) = 500\left(1 - \frac{t}{90}\right)$$

   (a) How much liquid remains in the
   (b) What is the average rate of chang
   0 min to 60 min?
   (c) How fast is the liquid draining at

14. **Application:** A population of raccoon
At t months, the number of raccoons

$$P(t) = 100 +$$

Determine the rate at which the racco
initial population has doubled in size

15. The volume of a sphere is given by V
   (a) Find the average rate of change o
   radius changes from 10 cm to 15
   (b) Find the rate of change of volum

16. **Thinking, Inquiry, Problem Solving:** I
intersection between the lines tangent

17. The average annual salary of a profes
by the function

$$S(x) = 246 + 64x$$

where S represents the average annua
is the number of years since 1982. De
salary is changing in 2005.

18. A football is kicked up into the air. It
at t seconds can be modelled by $h(t)$
   (a) Determine $h'(2)$.
   (b) What does $h'(2)$ represent?

19. **Check Your Understanding:** Determin
$y = 4x^3 - 3x + 6$ at point (1, 7).

C

20. At what point on the graph of $y = x^2$
$2x - y = 1$?

21. Determine the coordinates of each po
$f(x) = 2x^3 - 7x^2 + 8x - 3$ where th