THE ANTI-DERIVATIVE - CHAPTER REVIEW

1 Find the primitive of the following:

(a) $x+9$ **(b)** $3x^2-2x+4$ **(c)** x^4+x^3-2 **(d)** $(x-2)(x+3)$ **(e)** $(x+2)^2$ **(f)** 7

2 Express y in terms of x, given the following:

(a) $\frac{dy}{dx}=5x+4$ **(b)** $\frac{dy}{dx}=5-4x+3x^2+x^3$ **(c)** $\frac{dy}{dx}=2x+\sqrt{x}+3$

3 Find $f(x)$ in terms of x, given the following:

(a) $f'(x) = x^2 + x^3 + 1, f(0) = 2$ **(b)** $f'(x) = 3 - x + 6x^3, f(1) = 3$ **(c)** $f'(x) = 1 - \frac{1}{x^2}, f(2) = \frac{1}{2}$

4 During a storm, water flows into a 5000-litre tank at the rate of $\frac{dV}{dt}$ litres per minute, where $\frac{dV}{dt} = 140 + 13t - t^2$ and t is the time in minutes since the storm began.

(a) Find the volume of water that has flowed into the tank since the start of the storm as a function of t.

(b) How much water has flowed into the tank after 12 minutes?

5 **(a)** Show that $\frac{d}{dx}\left(xe^x\right) = e^x + xe^x$. **(b)** Hence find $\int xe^x\,dx$.

6 Find: **(a)** $\int 3\sin\frac{x}{2}\,dx$ **(b)** $\int\left(x+\sec^2 2x\right)dx$ **(c)** $\int\frac{\cos t}{\sin t}\,dt$

7 Find: **(a)** $\int \frac{5}{x}\,dx$ **(b)** $\int \frac{3}{x+4}\,dx$ **(c)** $\int \frac{4x}{x^2+1}\,dx$ **(d)** $\int \frac{e^x}{e^x+2}\,dx$