Mathematics 122

Quiz 36 Name: Key

You must show your work to get full credit.

1. Find an antiderivative of the following:

(a) $f(t) = 5t$ $F(t) = \frac{5}{2}t^2$

(b) $f(q) = 5q^2$ $F(q) = \frac{5}{3}q^3$

(c) $g(z) = \sqrt{z} = z^{\frac{1}{2}}$ $G(z) = \frac{2}{3}z^{\frac{3}{2}}$

(d) $r(t) = \frac{1}{t^2} = t^{-2}$ $R(t) = -t^{-1} = \frac{-1}{t}$

(e) $f(z) = e^z + 3$ $F(z) = e^z + 3z$

(f) $g(t) = e^{-3t}$ $G(t) = -\frac{1}{3}e^{-3t}$

2. Find the following antiderivatives:

$$\int (5x + 7)\,dx = \frac{5}{2}x^2 + 7x + C$$

$$\int 25e^{-0.05t}\,dt = \frac{25}{-.05}e^{-.05t} + C = -500e^{-.05t} + C$$

$$\int \left(\frac{3}{t} - 2t^{-2}\right)dt = \int \left(\frac{3}{t} - \frac{2}{t^2}\right)dt = 3\ln|t| + 2t^{-1} + C$$

$$\int 3w^{\frac{1}{2}}\,dw = \int 3\sqrt{w}\,dw = 3\left(\tfrac{2}{3}\right)w^{\frac{3}{2}} + C = 2w^{\frac{3}{2}} + C$$

3. Find the antiderivative, $F(x)$, of $f(x) = 4x + 1$ with $F(1) = 5$.

$F(x) = \frac{4x^2}{2} + x + C$

$= 2x^2 + x + C$

$F(x) = 2x^2 + x + 2$

To find C use $F(1) = 2(1)^2 + (1) + C = 5$

$3 + C = 5$

$C = 5 - 3 = 2$