

Engineering Maths Tutorial 12 (Elec)

1. Evaluate the following integrals

a) $\int e^{4x} dx$

b) $\int 21^x dx$

c) $\int \sec(3t) \tan(3t) dt$

d) $\int \frac{6t^2-2}{2t^3-2t-5}$

e) $\int_2^6 (8x^3 - 2x) dx$

2. Work out the following integrals.

a) $\int (t + 1)^4 dt$

b) $\int (2t - 6)^7 dt$

c) $\int 4x(2x^2 + 5)^3 dx$

d) $\int x^3(x^4 - 7)^{-3} dx$

e) $\int (3x^2 - 1)(x^3 - x - 5)^4 dx$

3. What are these antiderivatives?

a) $\int 2x \cos(x^2 - \pi) dx$

b) $\int e^x \sin(e^x) dx$

c) $\int \cos(x) \sin^2(x) dx$

4. Find the mean value of the following functions over the given intervals.

a) $y = 5$ between $x = -1$ and $x = 7$. (Is your answer a surprise?)

b) $y = 4x$ between $x = 1$ and $x = 3$. (Is your answer a surprise?)

c) $y = 3x^2 + x$ between $x = -2$ and $x = 2$.

d) $y = \sin(x)$ between $x = 0$ and $x = 2\pi$.

e) $y = 6x - x^2$ between $x = 0$ and $x = 2$.

5. Use Simpson's Rule to approximate the definite integral between $x = 0$ and $x = 4$ of a function with the following values.

x	0	0.5	1	1.5	2	2.5	3	3.5	4
$f(x)$	4	9	3	8	2	11	19	11	8

6. Use Simpson's Rule to approximate the definite integral between $x = 2$ and $x = 5.6$ of a function with the following values.

x	2	2.6	3.2	3.8	4.4	5	5.6
$f(x)$	7	12	3	2	0	1	6

7. Use Simpson's Rule to approximate the definite integral between $x = 1$ and $x = 6$ of $\sqrt{1 + x^2}$. You may want to use the table below to help you.

x	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
$f(x)$											

- 1.