

1. Evaluate

(a) $\frac{3}{2} + \frac{5}{7} \times \frac{1}{8}$ (b) $\sin \frac{3\pi}{4}$ (c) $\sin 30$ (d) $\tan^{-1}(1)$ (e) $\sum_1^4 x$

2. Define the functions

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

$$g(x) = x + 1$$

$$z = x^2 + 1$$

3. Evaluate the functions

a) $2f(x) + g(x)$

b) $f(2)$

d) $f(g(2))$

e) $f(x) \circ g(x)$

f) $\int f(x) dx$

g) $\int_0^t z dx, \quad \frac{dz}{dx}$

4. Equations or Inequality

Solve

a) $2x + 3x = 1$

b) $2x^2 + x - 3 = 0$

c) $3x + 5 \leq 5x - 3$

d) $2x - y = 1$

e) $2^x - 5x + 1 = 0$

f) $x = 10 \sin x$

$x + 3y = 4$

g) $\tan x = 100$

h) $\sinh x = 1$

i) $\tanh x = 1$

5. Doing mathematics in a matrix, Given

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 1 & 4 & 3 \\ 1 & 3 & 6 \end{bmatrix}, B = \begin{bmatrix} 3 & 3 & 2 \\ 4 & 33 & 11 \\ 1 & 5 & 4 \end{bmatrix}$$

i. Find A^{-1} and eigenvalues of A

ii. $A + 2B$, and AB

6. Polynomials $(a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0)$

i. Evaluate $\sum_{k=0}^5 a_k x^k$

ii. Collect (for x then for t) $5t^2 + 2t - 16t^5 + xt^3 - 2xt^2 + 9 + at^2$

iii. Sort (for x then for t) $5t^2 + 2t - 16t^5 + xt^3 - 2xt^2 + 9 + at^2$

7. Factor $\frac{5}{2}x^3\sqrt{3} + 5x^4\sqrt{3}$, and **Expand** $(x+3)^2 + 5(x+4)$ **8. Find the roots of the following polynomials**

a. $x^2 + 1$

b. $5x^2 + 2x - 3$

c. $x^3 - \frac{13}{5}ix^2 - 8x^2 + \frac{29}{5}ix + \frac{81}{5}x + 6i - \frac{18}{5}$

9. Find the greatest common divisor and least common multiple for the following polynomials

$(5x^2 - 5x, 10x - 10)$