

Exercises

1.Evaluate:

- (a) $3 + 9$
- (b) 2^{123}
- (c) π^2 and e to 35 digits
- (d) the fraction $\frac{22}{7}$, $\frac{311}{99}$, and $\frac{355}{113}$, and determine which is the best approximation to π

2.Evaluate to ten digits:

- (a) $\frac{\sin(0.1)}{0.1}$
- (b) $\frac{\sin(0.01)}{0.01}$
- (c) $\frac{\sin(0.0001)}{0.0001}$

3.Factor the polynomial $x^3 - y^3$.

4.Use the plot command to graph the following:

- (a) $y = 3x + 2$ for $-5 \leq x \leq 5$
- (b) $y = x^2 + x - 1$ for $-5 \leq x \leq 5$
- (c) $y = \sin x$ for $0 \leq x \leq 4\pi$
- (d) $y = \tan x$ for $-\pi/2 \leq x \leq \pi/2$
- (e) $y = e^{-x^2}$ for $-2 \leq x \leq 2$

5.The derivative of a function can be found by typing $\text{diff}(f(x), x)$. Find the derivatives of the following functions. In each case, if it appears that the answer Maple gives can be simplified, investigate the possibility by using simplify .

- (a) $f(x) = 7x^3 + 3x^2 - 2x + 1$
- (b) $f(x) = \frac{x+1}{x^2+1}$
- (c) $f(x) = \cos(x^2 + 1)$
- (d) $f(x) = \arcsin(2x + 3)$
- (e) $f(x) = \sqrt{1 + x^4}$
- (f) $f(x) = x^r$
- (g) $f(x) = \arctan(x)$.

6.Use the Maple command limit to evaluate the following limits:

- (a) $\lim_{x \rightarrow 0} \frac{\sin x}{x}$
- (b) $\lim_{x \rightarrow \pi} \frac{1 + \cos x}{x - \pi}$

$$(c) \quad \lim_{x \rightarrow \infty} x e^{-x}$$

$$(d) \quad \lim_{x \rightarrow 1^-} \frac{1}{x-1}$$

$$(e) \quad \lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right)$$

7. Find the following integrals:

$$(a) \quad \int_0^{\frac{\pi}{2}} \sin x \, dx$$

$$(b) \quad \int x \cos(x^2) \, dx$$

$$(c) \quad \int \sin(3x) \sqrt{1 - \cos(3x)} \, dx$$

$$(d) \quad \int \ln x \, dx$$

$$(e) \quad \int x^2 \sqrt{x+4} \, dx$$

$$(f) \quad \int \sqrt{x^4 + 1} \, dx$$

$$(g) \quad \int e^{\cos x} \, dx$$

$$(h) \quad \int_{-\infty}^{\infty} e^{-x^2} \, dx.$$