

NAME : *answers*

1. Let $x = [-4 \ -1 \ 2 \ 3 \ 9]$ and $y = [80 \ 14 \ 2 \ 10 \ 184]$.

Give the MATLAB command(s) to find the polynomial relation between x and y .

What is the degree of the polynomial p so $y = p(x)$? Write the coefficients of p .

```
x = [-4 -1 2 3 9]; y = [80 14 2 10 184];
c = polyfit(x,y,2)
c =
    3.0000   -7.0000    4.0000
c = polyfit(x,y,3)
c =
    6.2095e-16    3.0000e+00   -7.0000e+00    4.0000e+00
```

We see that the degree of the polynomial is two: $p(x) = 3x^2 - 7x + 4$.

2. A Gaussian quadrature rule to approximate an integral is

$$\int_{-h}^{+h} f(x)dx \approx hf \left(-\frac{\sqrt{3}}{3} \right) + hf \left(+\frac{\sqrt{3}}{3} \right), \quad h > 0.$$

The formula at the right of \approx evaluates any function f at $-\sqrt{3}/3$ and at $+\sqrt{3}/3$ and multiplies the sum of the function values with h .

- (a) Give code for a MATLAB function `integrate` to compute the rule.
The input parameters for `integrate` are any function f and a number h .

```
function y = integrate(f,h)
% returns an approximation of the
% integral of f in [-h,+h]
b = sqrt(3)/3; a = -b;
y = h*feval(f,a) + h*feval(f,b);
```

- (b) Write the call to the function `integrate` to approximate $\int_{-0.13}^{+0.13} \cos(x)dx$.
Also write the approximation returned by `integrate`.

```
integrate('cos',0.13)
ans = 0.2179
```

Alternative: Bring to class on Monday the answers to assignments 1, 3, and 4 of the third lecture on MATLAB; and assignments 3 and 8 of MATLAB lecture 4.