1.

(a).

$$Q_0(x) = 2x^2 + bx + 1$$

$$Q_1(x) = ax^2 + 3x + c$$

$$Q_2(x) = dx^2 + 1$$

$$Q_0'(x) = 4x + b$$

$$Q_1'(x) = 4ax + 3$$

$$Q_2'(x) = 2dx$$

When x=1:

2+b+1 = a+3+c

b+4 = 2a+3

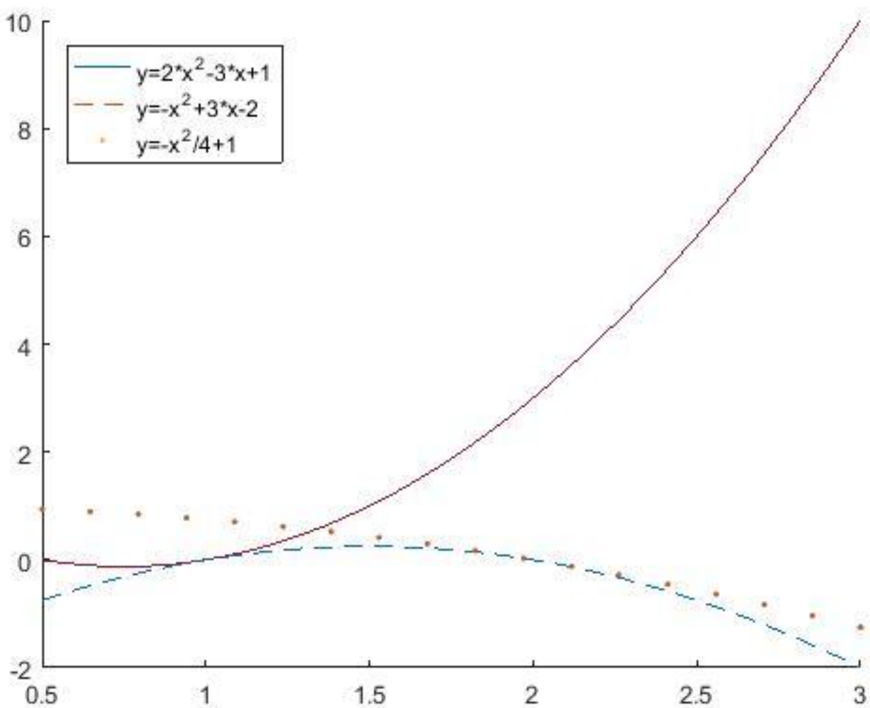
When x=2:

4a+6+c = 4d+1

4d = 4a+3

Then, a = -1; b = -3; c = -2; d = -0.25.

(b).



2.

$$\int_{-1}^{1} 1dx = x\Big|_{-1}^{1} = 2$$

$$\int_{-1}^{1} xdx = \frac{x^2}{2}\Big|_{-1}^{1} = 0$$

$$\int_{-1}^{1} x^2dx = \frac{x^3}{3}\Big|_{-1}^{1} = \frac{2}{3}$$

$$\int_{-1}^{1} x^3dx = \frac{x^4}{4}\Big|_{-1}^{1} = 0$$

Then,

a(1)+b(1)+c(0)+(0)=2

a(-1)+b(1)+c(1)+(-1)=0

a(1)+b(1)+c(2)+(2)= $\frac{2}{3}$

a(-1)+b(1)+c(3)+(3)=0

We have a = 1; b = 1; c = $\frac{1}{3}$; d = - $\frac{1}{3}$.

3.

(a).

```
function trap( a, b, maxiter, tol, f)
m = 1;
x = linspace( a, b, m+1 );
y = feval(x);
approx = trapz( x, y );
disp(' m integral approximation');
fprintf(' %5.0f %16.10f \n ', m, approx);
for i = 1 : maxiter
   m = 2*m;
   oldapprox = approx;
   x = linspace ( a , b , m+1 ) ;
   y = feval(f,x);
   approx = trapz(x, y);
```

```
    fprintf(' %5.0f %16.10f \n ', m, approx);
    if abs( 1 - oldapprox/approx ) < tol
        return
    end
end
fprintf('Did not converge in %g iterations\n', maxiter)
```

(b).

f1.m

```
function y = f1(x)
    y = (x).*cos((1)./(x));
end

>> trap(0.1, 3, 20, 1e-5, @f1)
 m integral approximation
     1     3.9888973448
     2     3.7902074408
     4     3.5976493493
     8     3.4808457876
    16     3.4678411685
    32     3.4856113710
    64     3.4877924488
   128     3.4870325249
   256     3.4867926880
   512     3.4867333190
  1024     3.4867185769
```

f2.m

```
function y = f2(x)
    y = exp((3).*(x)).*sin((x+1).^(1/2)+1);
end
```

```
>> trap(-1, 1, 20, 1e-7, @f2)
 m integral approximation
    1    13.3970553517
    2     7.6078251027
    4     5.6929741681
    8     5.1698664471
   16     5.0360666322
   32     5.0024583324
   64     4.9940594943
  128     4.9919647293
  256     4.9914430366
  512     4.9913133379
 1024     4.9912811709
 2048     4.9912732205
 4096     4.9912712651
 8192     4.9912707877
```