AER336 Problem Set 2

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```
clear
```

Question 2b

```
points = [1 2 4 8]';

Q = zeros(4,6);
for i = 1:6
    f2 = @(p) composite_gauss2(@(x) x^(i-1), 0, 1, p);
    Q(:, i) = 1/i - arrayfun(f2, points);
end
disp(Q)
```

```
           0           0           0   2.7756e-17   5.5556e-03   1.3889e-02
           0           0           0            0   3.4722e-04   8.6806e-04
           0           0  -5.5511e-17            0   2.1701e-05   5.4253e-05
           0           0           0            0   1.3563e-06   3.3908e-06
```

Question 3b

```
format shorte
points = [1e-2 1e-5 1e-8]';
f = @(p)adaptive_gauss_kronrod(@(x)2 * sqrt(1 -x^2), -1, 1, p);
[q, e, cnt] = arrayfun(f, points);
ans_real = pi;
err = abs(q - ans_real);
disp('value (Q) Error (|I - Q|) Estimated Error(E) Function Interation');
```

```
value (Q) Error (|I - Q|) Estimated Error(E) Function Interation
```

```
disp([q err e cnt])
```

```
   3.1416e+00   3.3649e-06   8.8956e-04   2.2500e+02
   3.1416e+00   8.2146e-10   3.3910e-09   7.0500e+02
   3.1416e+00   1.9096e-13   1.3547e-14   1.1850e+03
```

Question 3c

choose the error bound to be 10^{-5}, since we need 4 significant digits.

```
f = @(x) ktgeom(x);
[v, err, count] = adaptive_gauss_kronrod(f, 0, 1, 1e-5);
v = v*2
```

```
v =
   7.6955e-02
```

```
err
```

```
err =
   1.7759e-07
```

```
count
```

```
count =
   195
```