In which cases is Gauss's law true (give most inclusive answer)?

A) When there is spherical symmetry.
B) When there is spherical or cylindrical symmetry.
C) When there is spherical or cylindrical symmetry or an infinite flat plate.
D) When there is any kind of axial symmetry.
E) Always.

We begin with an object charged to one nanocoulomb. We remove six electrons. By what fraction have we changed the charge of the object?

A) By 1%

B) By a part in a thousand.

C) By a part in a million.

D) By a part in a billion.

A 100 g spherical potato is 10 cm in diameter and contains 6x10^27 electrons and protons. We remove one of every trillion electrons. **What force do opposite sides of the potato exert on eachother?**

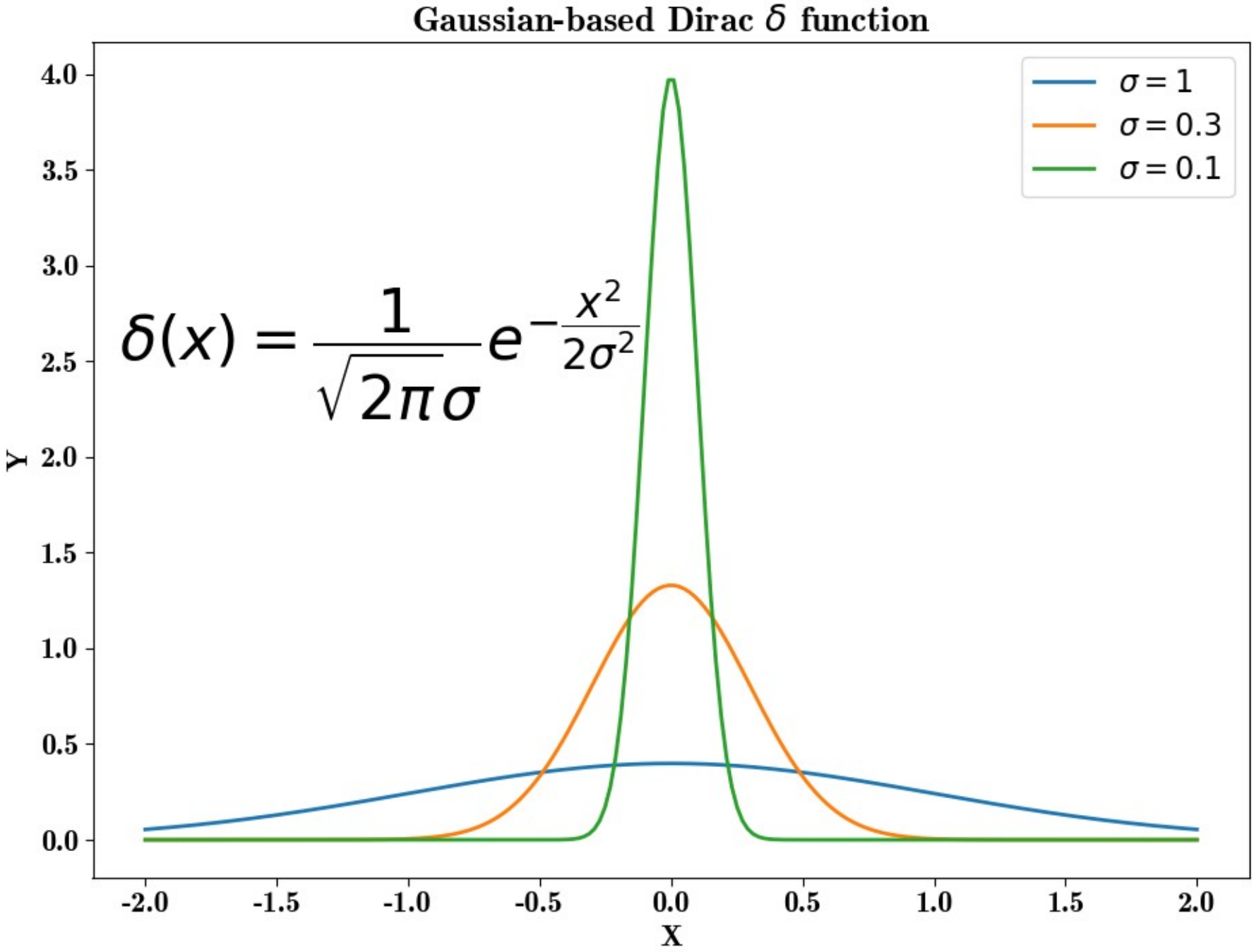
A) Less than a Newton.

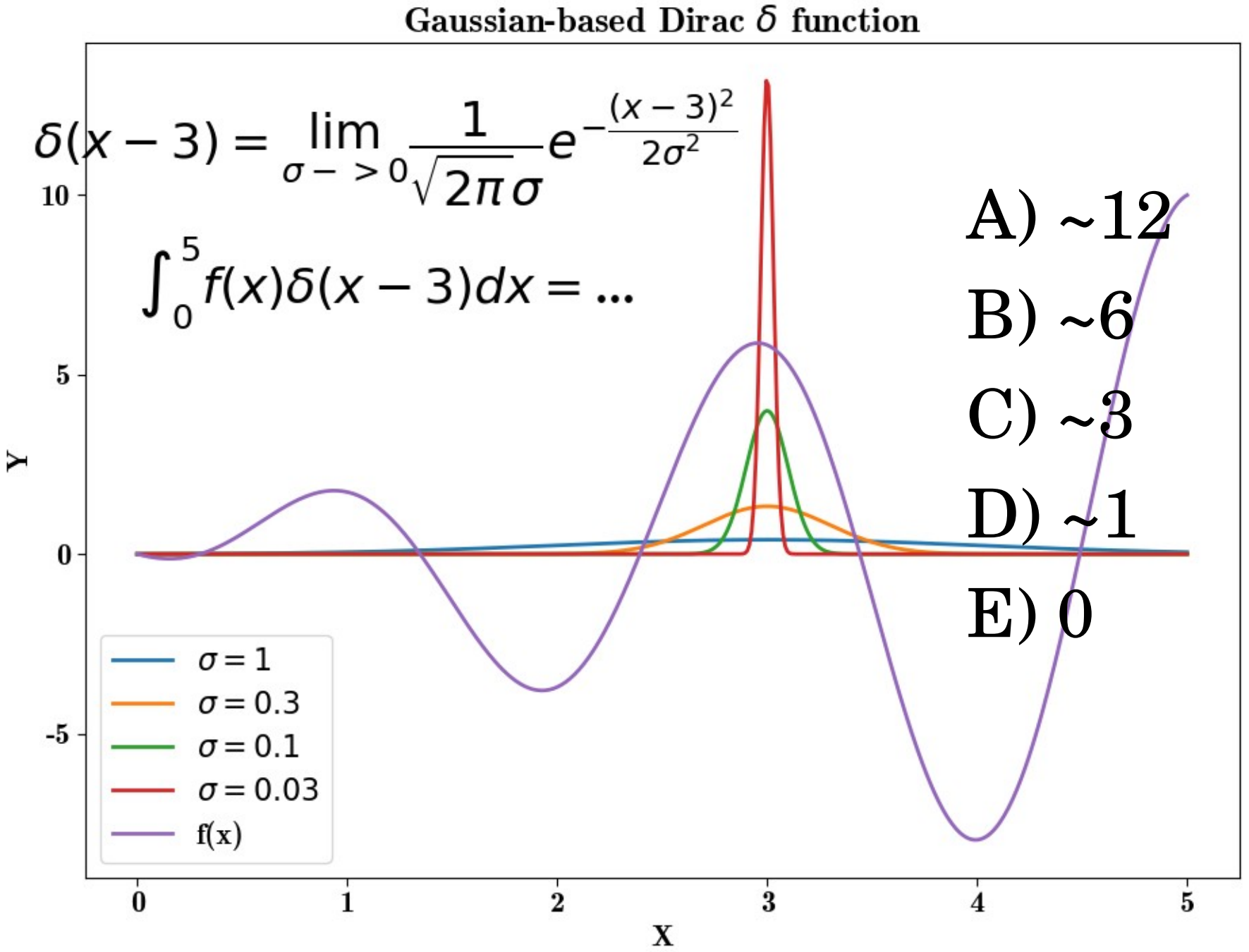
B) About 10 Newtons.

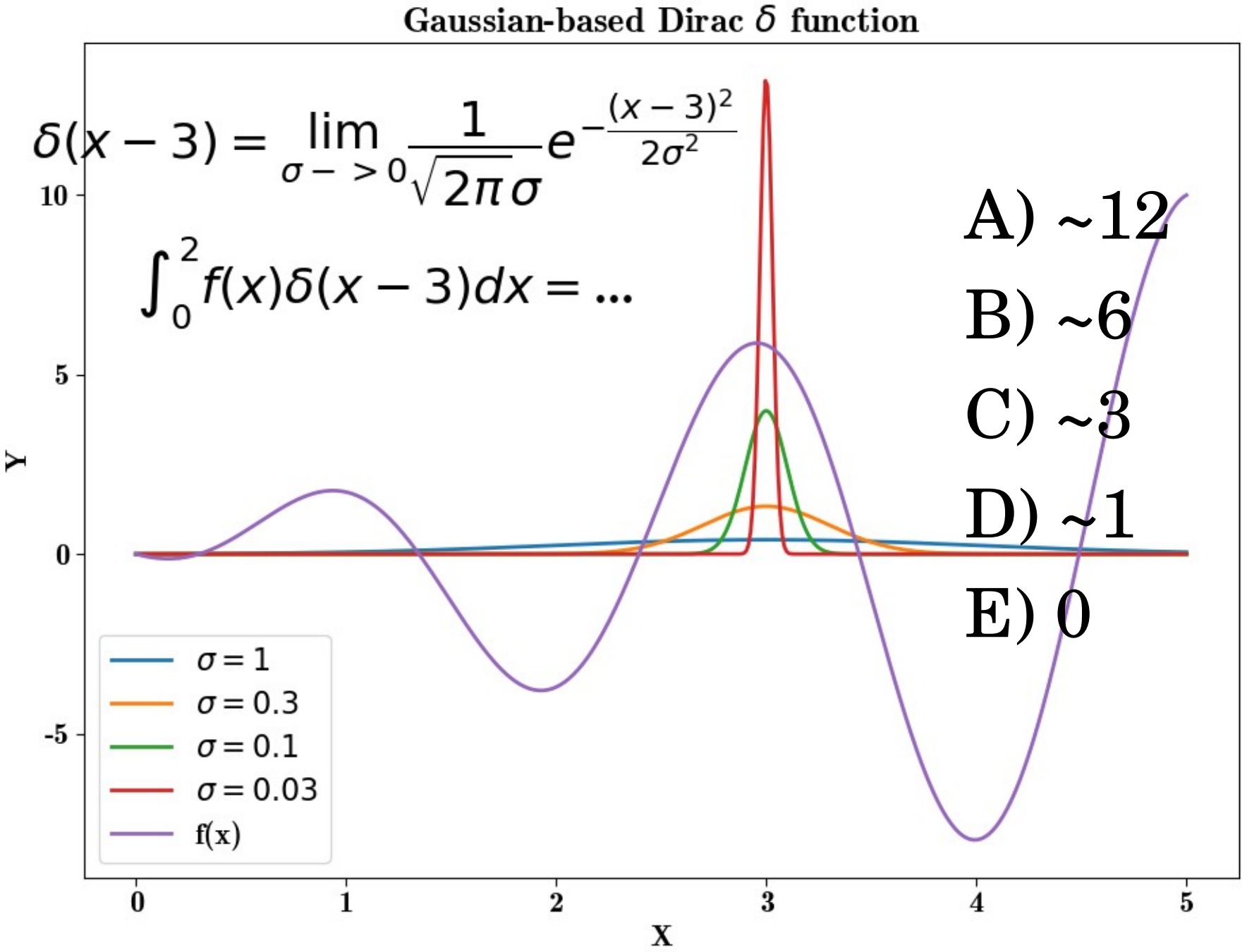
C) About a thousand Newtons.

D) About a million Newtons.

E) About a billion Newtons.


Gaussian-based Dirac δ function
$\delta(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{x^2}{2\sigma^2}}$
$\sigma = 1$
$\sigma = 0.3$
$\sigma = 0.1$
Y
X
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-2.0
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0


Gaussian-based Dirac δ function
$\delta(x-3) = \lim_{\sigma->0} \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-3)^2}{2\sigma^2}}$
$\int_0^5 f(x)\delta(x-3)dx = \ldots$
A) ~12
B) ~6
C) ~3
D) ~1
E) 0
σ = 1
σ = 0.3
σ = 0.1
σ = 0.03
f(x)
Y
X
10
5
0
-5
0
1
2
3
4
5


Gaussian-based Dirac δ function
$\delta(x-3) = \lim_{\sigma->0} \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-3)^2}{2\sigma^2}}$
$\int_0^2 f(x)\delta(x-3)dx = \ldots$
A) ~12
B) ~6
C) ~3
D) ~1
E) 0
σ = 1
σ = 0.3
σ = 0.1
σ = 0.03
f(x)
Y
X
10
5
0
-5
0
1
2
3
4
5