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$TextStyle = {FontFamily -> "Times", FontSize -> 14};
<< Graphics`Graphics` (* needed for BarChart *)

Clear[k0, σ];
F[k_, k0_, σ_] := Exp[-(k - k0)^2 / (2 * σ^2)] / (√(2 π) σ)
f = Integrate[F[k, k00, σ0] Sin[k x], {k, 0, ∞}, Assumptions -> σ0 > 0]

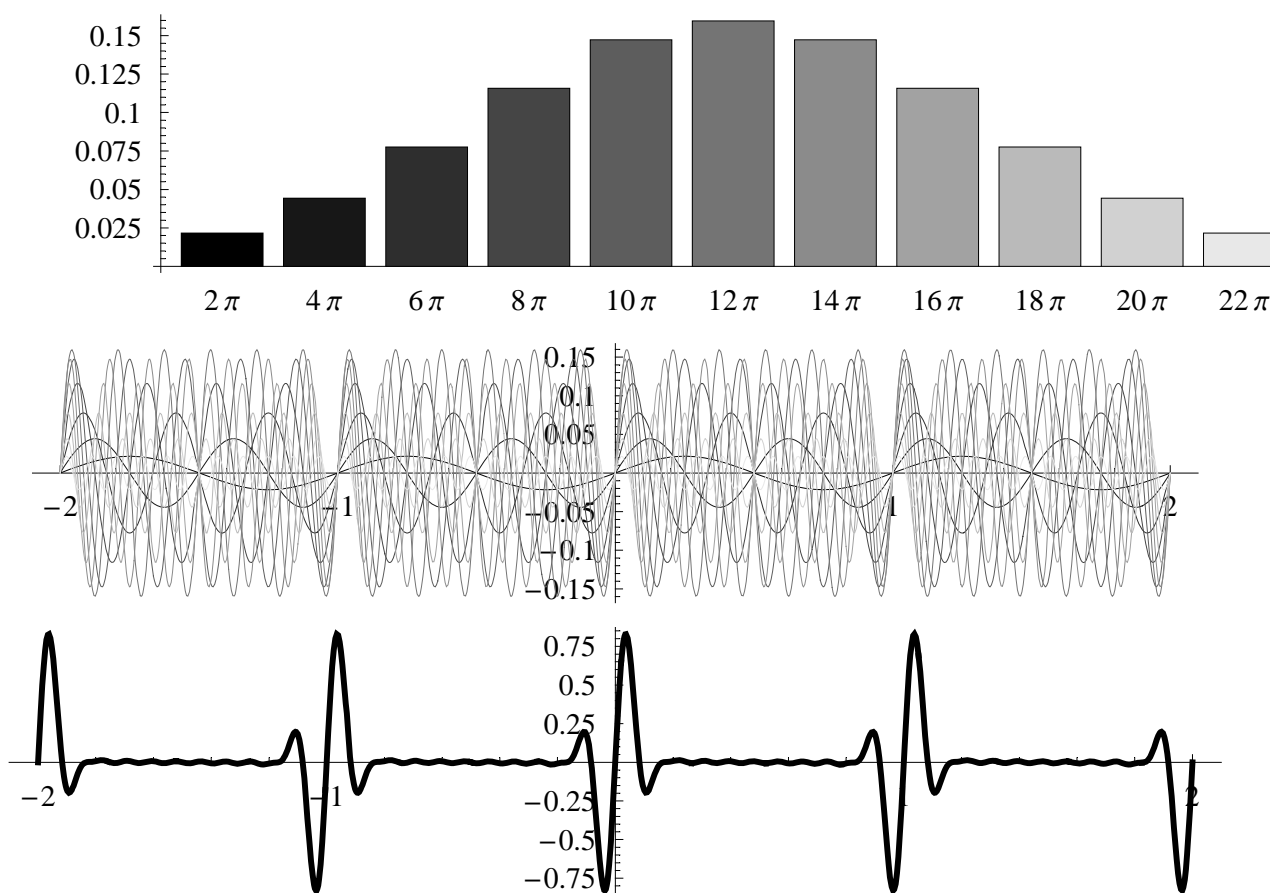

$$-\frac{1}{4} i e^{-\frac{1}{2} x (2 i k_{00} + x \sigma_0^2)} \left( -1 - \operatorname{Erf}\left[\frac{k_{00} - i x \sigma_0^2}{\sqrt{2} \sigma_0}\right] + e^{2 i k_{00} x} \left( 1 + \operatorname{Erf}\left[\frac{k_{00} + i x \sigma_0^2}{\sqrt{2} \sigma_0}\right] \right) \right)$$


makeplot[σ_] := Module[{k0 = 6 2 π},
  For[n = 1, n ≤ 8, n = n + 2,
    elems = 11 * n;
    coeffs = 2 π / n Table[F[2 π k / n, k0, σ], {k, elems}];
    sins = Table[Sin[2 π k x / n], {k, elems}];
    list = coeffs * sins;
    colors = Array[GrayLevel[(# - 1) / elems] &, elems];
    If[Mod[σ, π] == 0,
      Print[StringJoin["Δx = 1/", ToString[σ / π], "π, Δk = ",
        ToString[σ / π], "π, k1 = π/", ToString[n]]], Print[StringJoin["Δx = 1/",
        ToString[σ], "π, Δk = ", ToString[σ], "π, k1 = π/", ToString[n]]];
      BarChart[coeffs, BarStyle -> colors, BarLabels ->
        Flatten[Array[Append[Table["", {n - 1}], 2 π #] &, elems / n]], AspectRatio -> 1 / 4.5,
        ImageSize -> 72 * 9, PlotRange -> All]; Plot[Evaluate[list], {x, -2, 2},
        PlotRange -> All, AspectRatio -> 1 / 4.5, PlotStyle -> colors, ImageSize -> 72 * 8];
      Plot[Evaluate[Sum[list[[n]], {n, elems}]], {x, -2, 2}, PlotRange -> All,
        AspectRatio -> 1 / 4.5, PlotStyle -> Thickness[0.005], ImageSize -> 72 * 8];]
    If[Mod[σ, π] == 0,
      Print[
        StringJoin["Δx = 1/", ToString[σ / π], "π, Δk = ", ToString[σ / π], "π, k1 = 0"]],
        Print[StringJoin["Δx = 1/", ToString[σ], "π, Δk = ", ToString[σ], "π, k1 = 0"]];
      Plot[F[k, k0, σ], {k, 0, 22 π}, PlotRange -> {0, F[k0, k0, σ]}, AspectRatio -> 1 / 4.5,
        ImageSize -> 72 * 8, Ticks -> {Table[i π, {i, 2, 22, 2}], Automatic}];
      Plot[f /. {k00 -> k0, σ0 -> σ}, {x, -2, 2}, PlotRange -> All,
        AspectRatio -> 1 / 4.5, PlotStyle -> Thickness[0.005], ImageSize -> 72 * 8];]

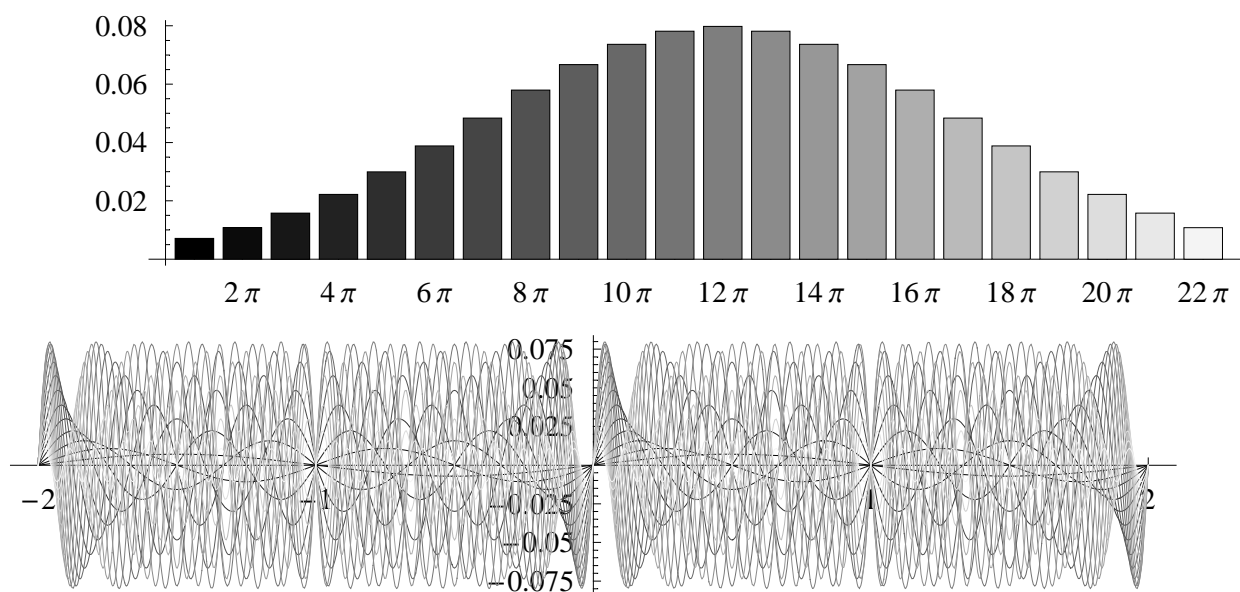
makeplot[5 π];
makeplot[4 π];
makeplot[3 π];
makeplot[2 π];
makeplot[1 π];
makeplot[1];

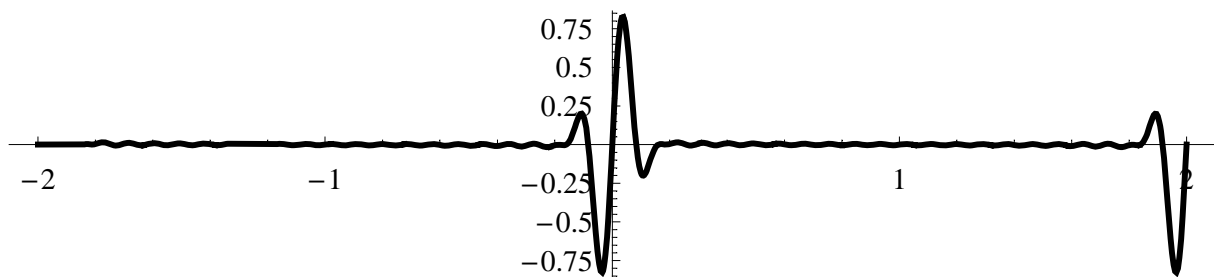
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Δx = 1/5π, Δk = 5π, k₁ = π/1

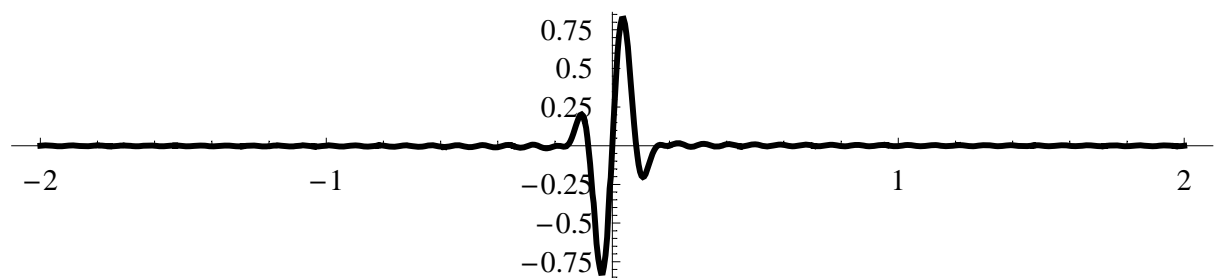
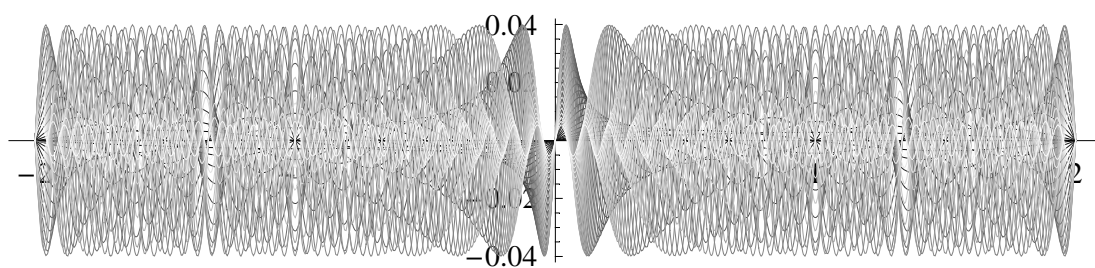
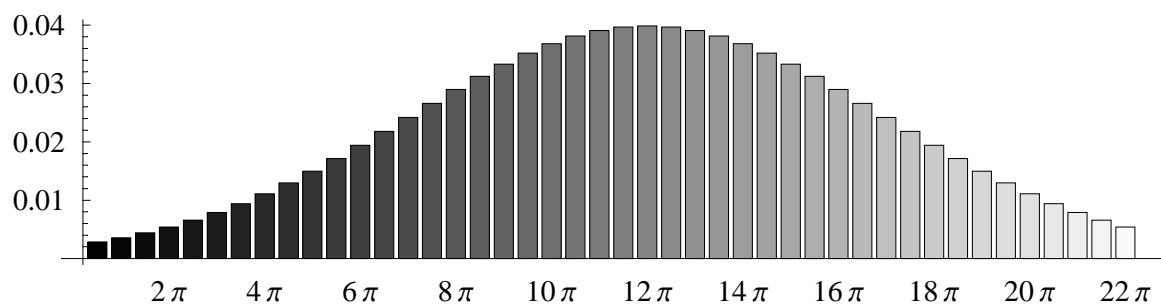


$$\Delta x = 1/5\pi, \Delta k = 5\pi, k_1 = \pi/2$$

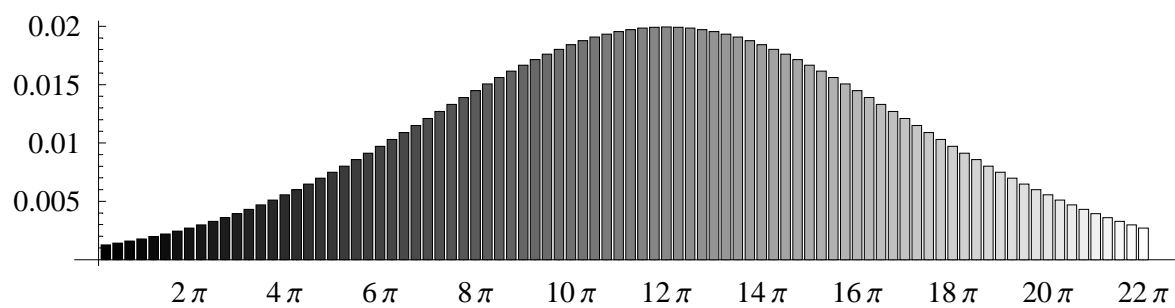


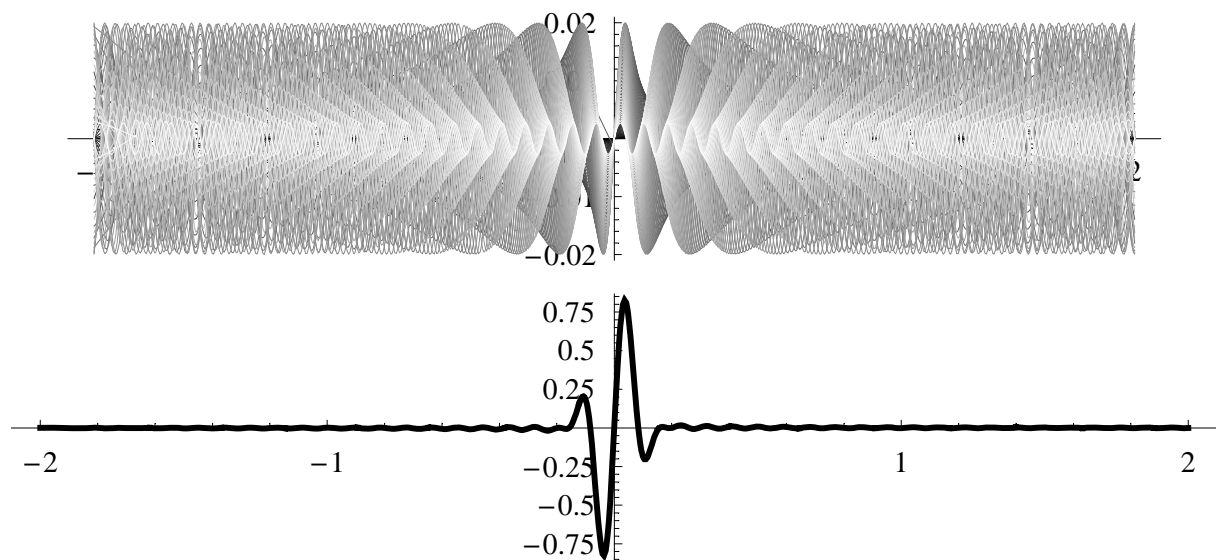


$$\Delta x = 1/5\pi, \Delta k = 5\pi, k_1 = \pi/4$$

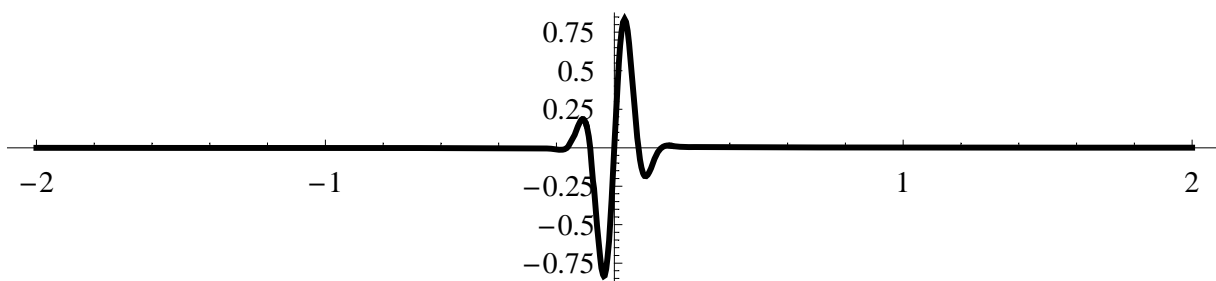
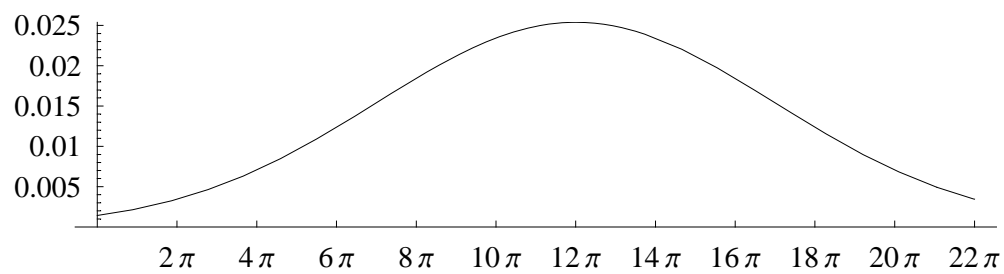


$$\Delta x = 1/5\pi, \Delta k = 5\pi, k_1 = \pi/8$$

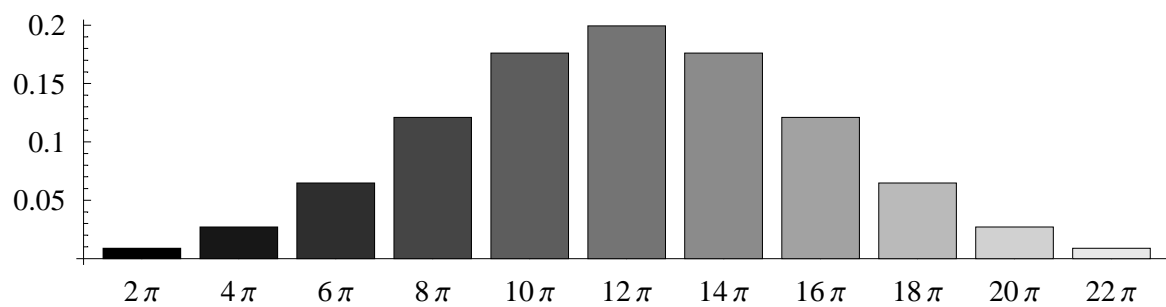


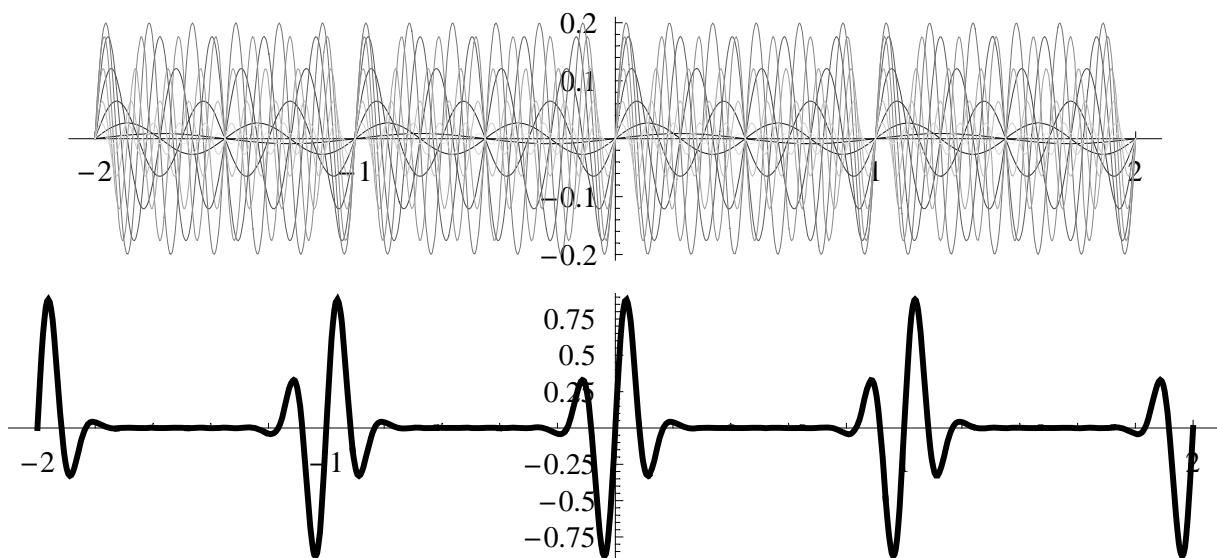


$$\Delta x = 1/5\pi, \Delta k = 5\pi, k_1 = 0$$

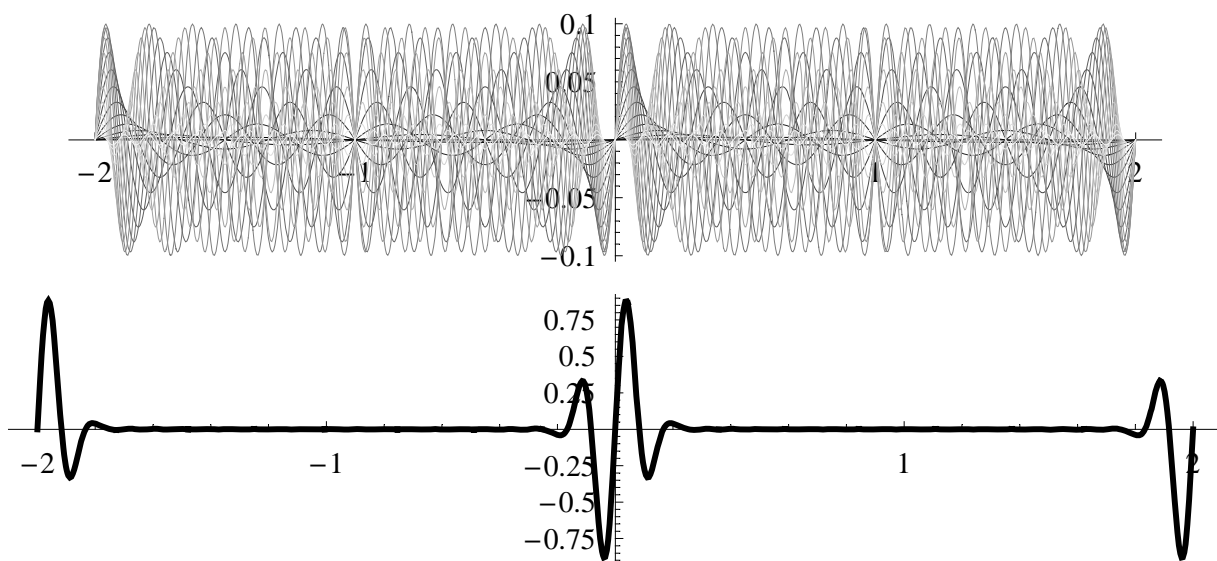
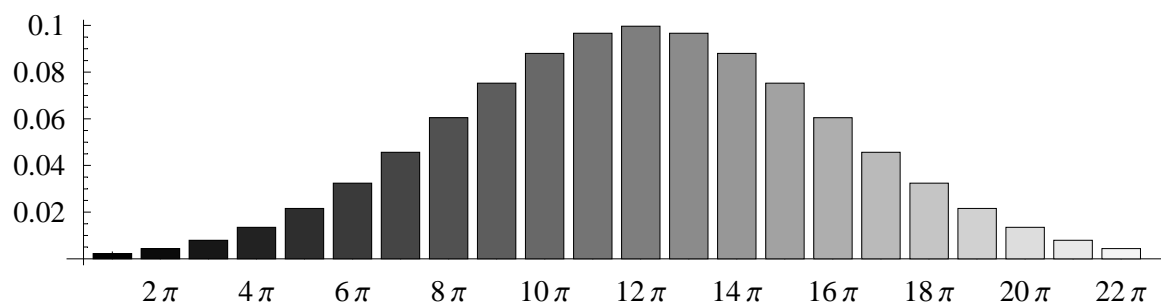


$$\Delta x = 1/4\pi, \Delta k = 4\pi, k_1 = \pi/1$$

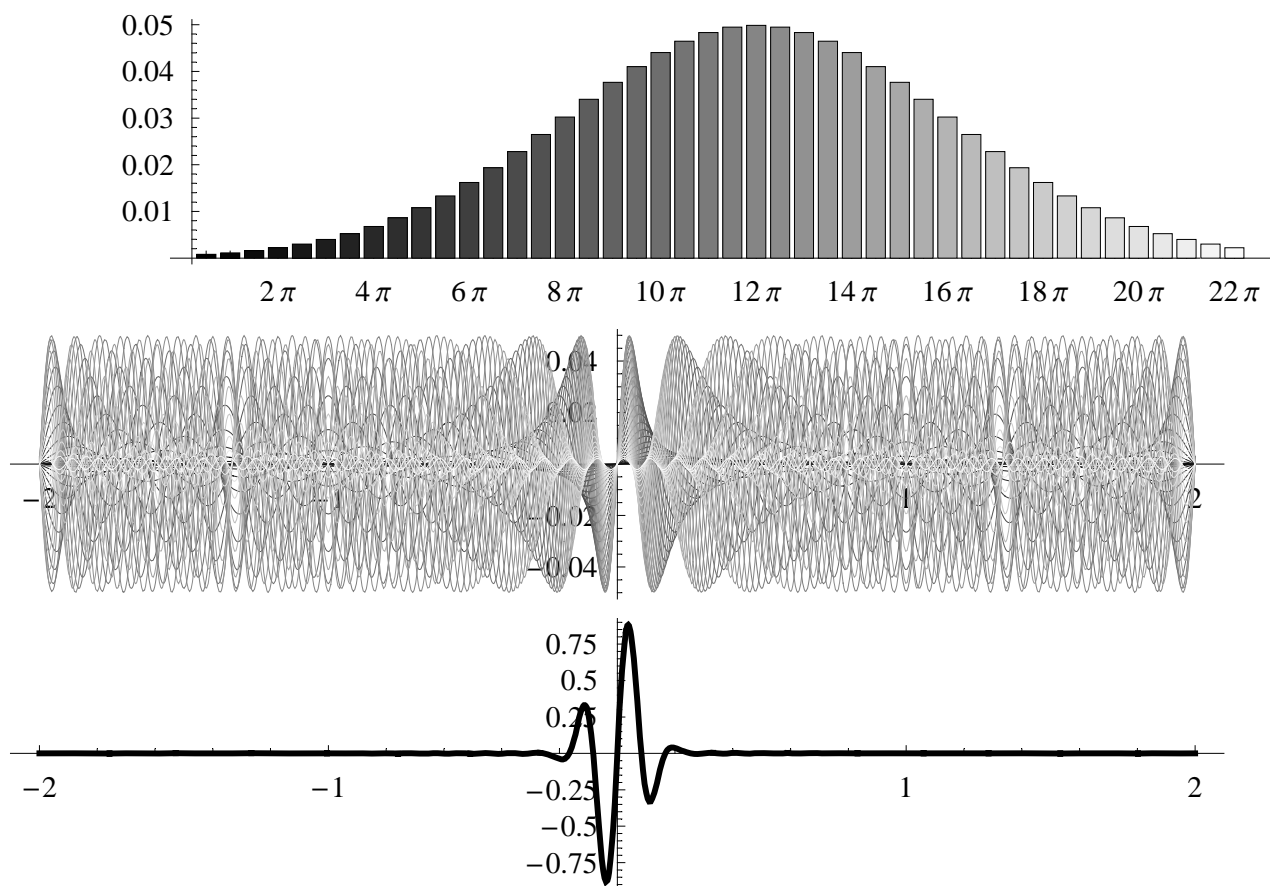




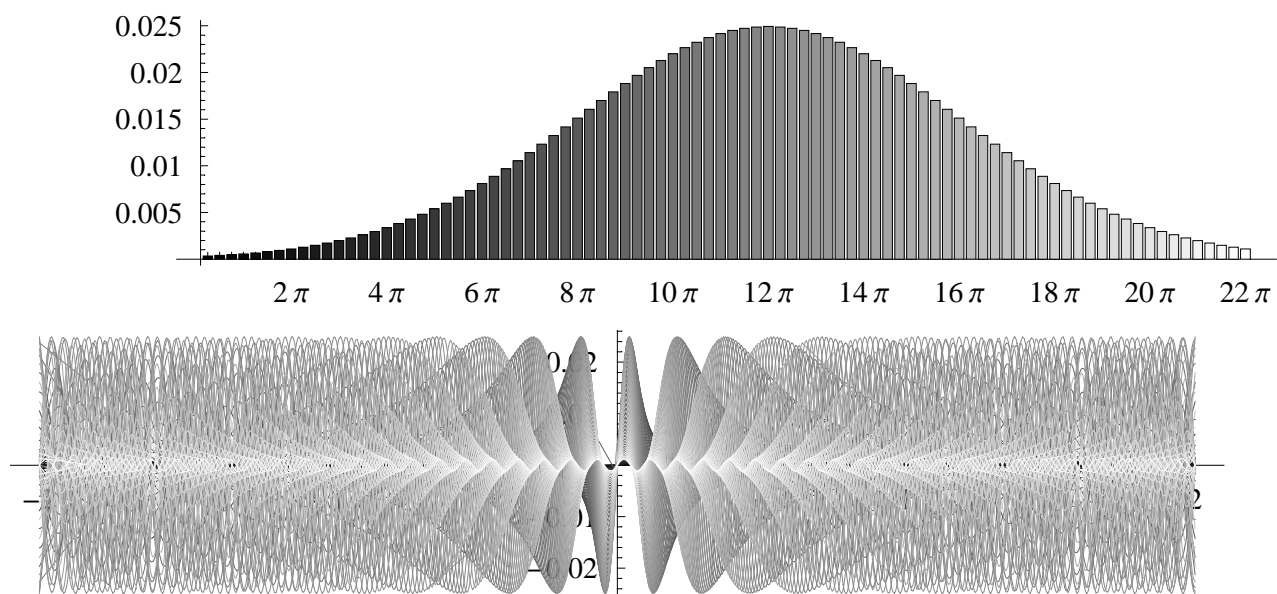
$$\Delta x = 1/4\pi, \Delta k = 4\pi, k_1 = \pi/2$$

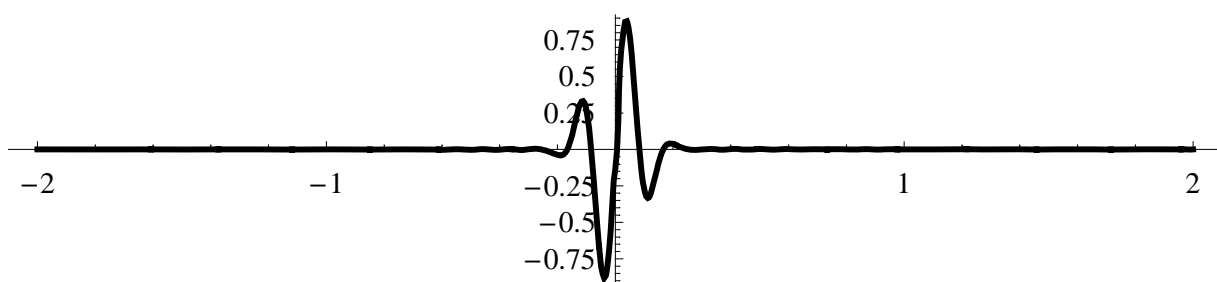


$$\Delta x = 1/4\pi, \Delta k = 4\pi, k_1 = \pi/4$$

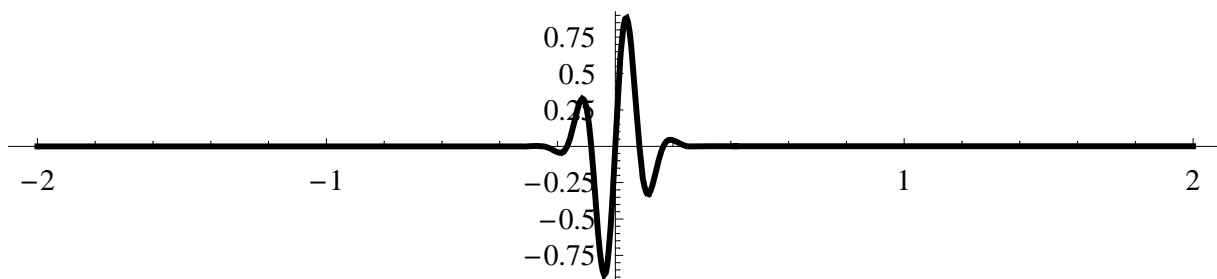
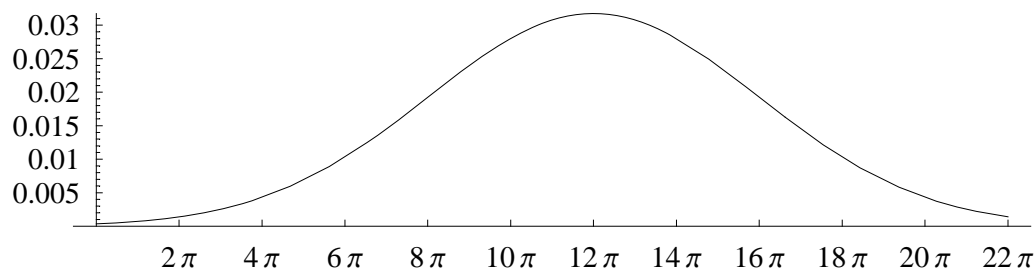


$$\Delta x = 1/4\pi, \Delta k = 4\pi, k_1 = \pi/8$$

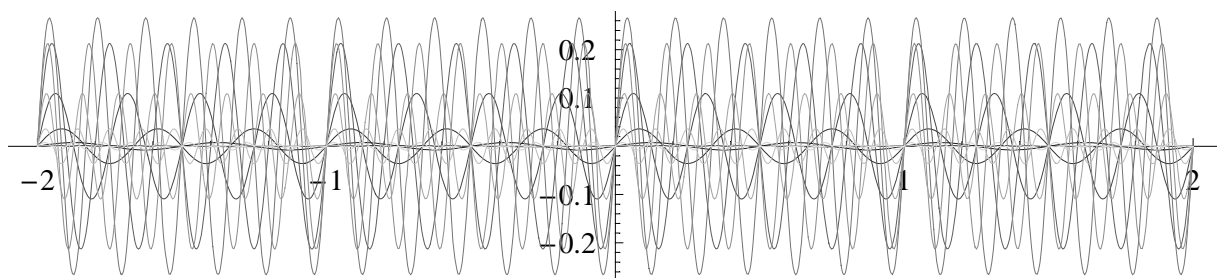
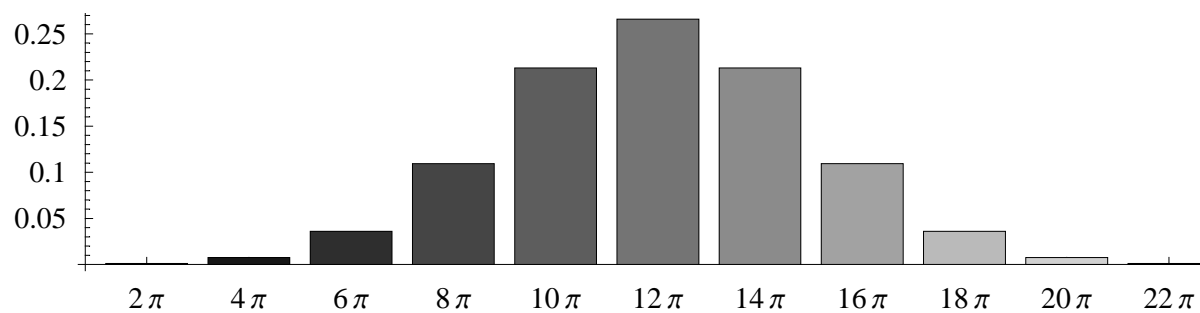


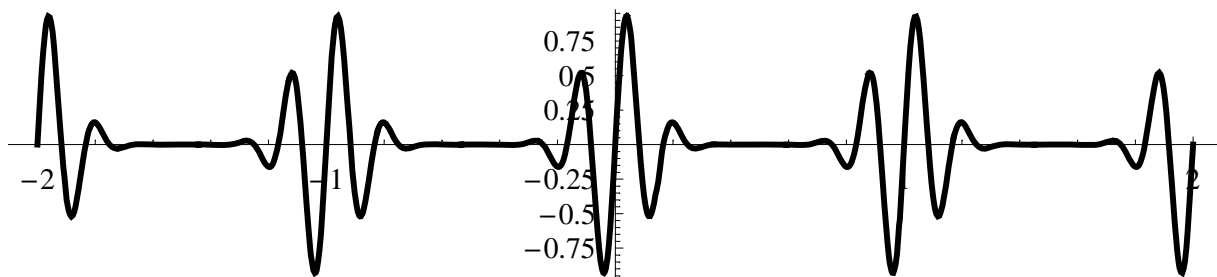


$$\Delta x = 1/4\pi, \Delta k = 4\pi, k_1 = 0$$

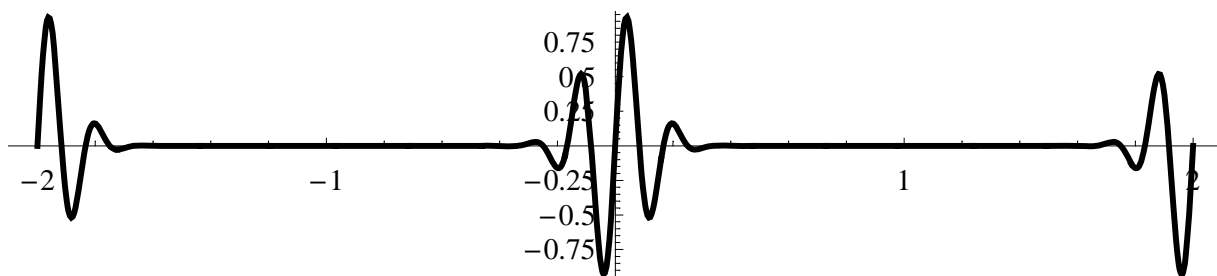
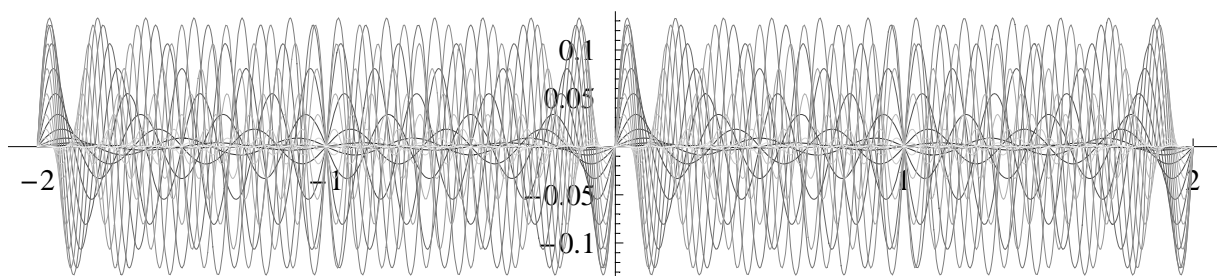
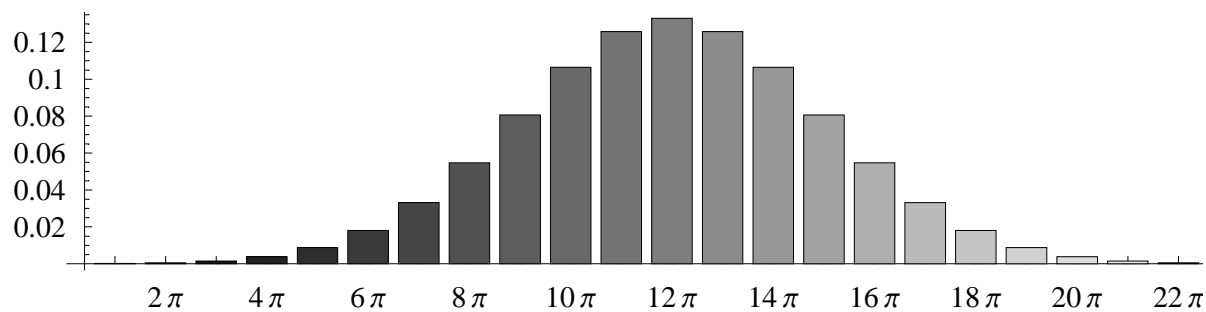


$$\Delta x = 1/3\pi, \Delta k = 3\pi, k_1 = \pi/1$$

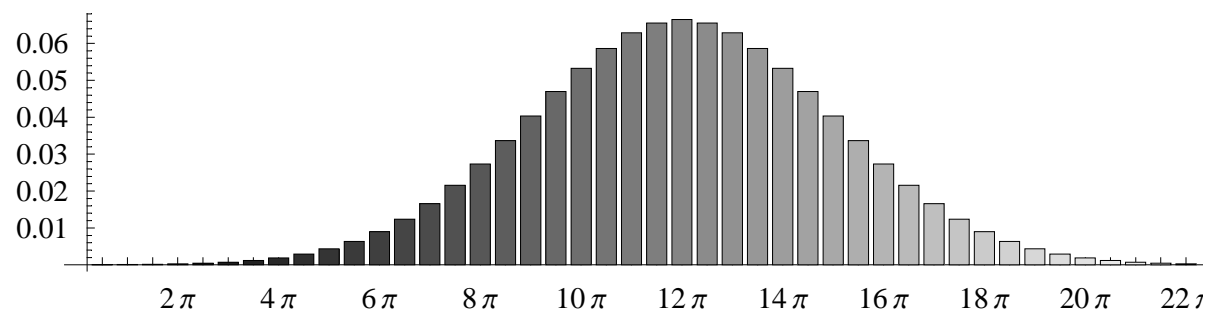


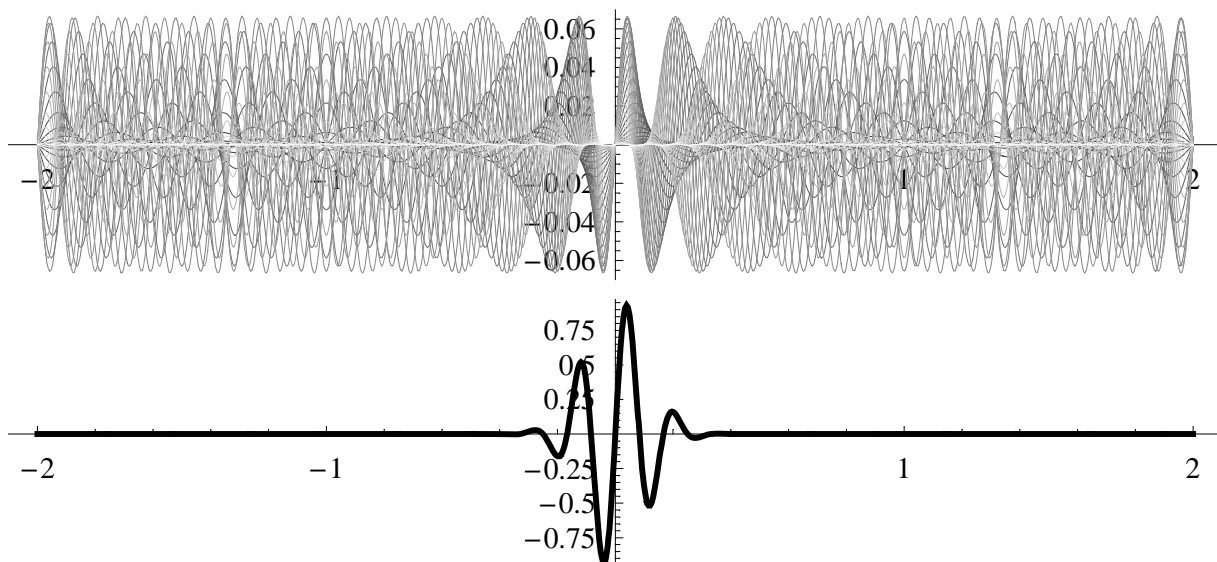


$$\Delta x = 1/3\pi, \Delta k = 3\pi, k_1 = \pi/2$$

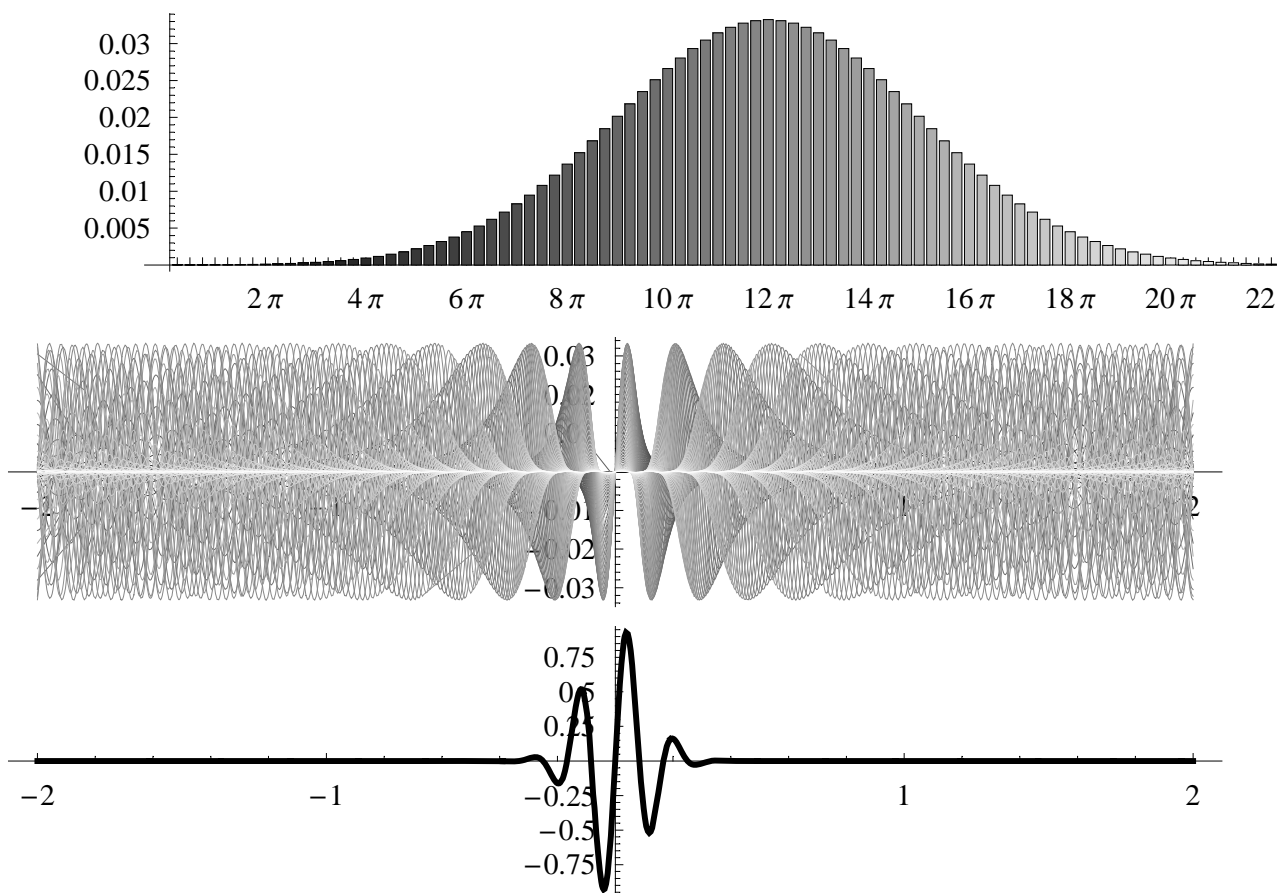


$$\Delta x = 1/3\pi, \Delta k = 3\pi, k_1 = \pi/4$$

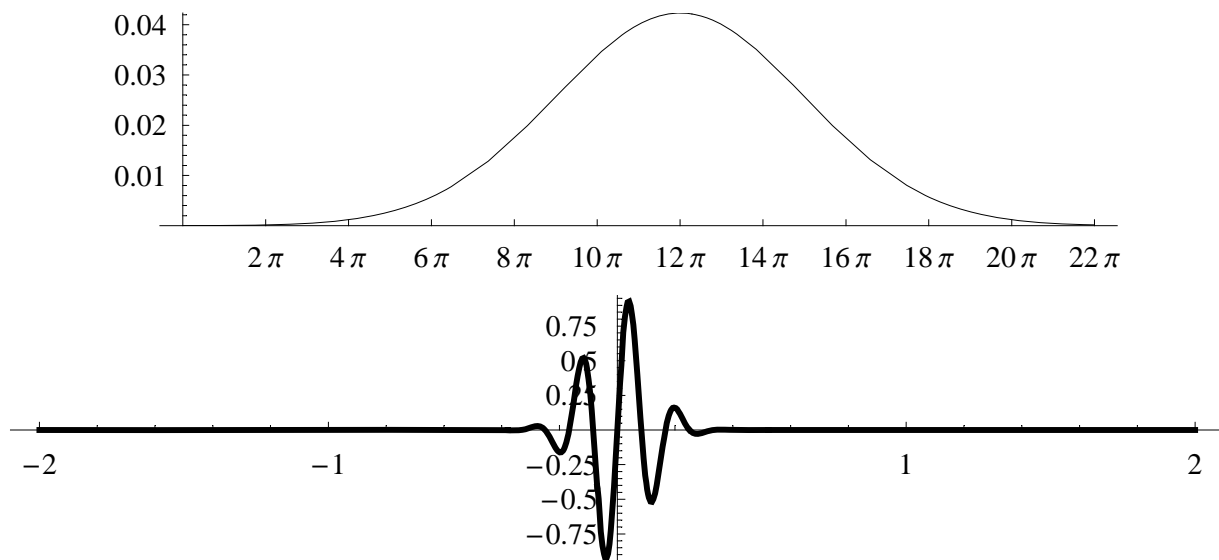




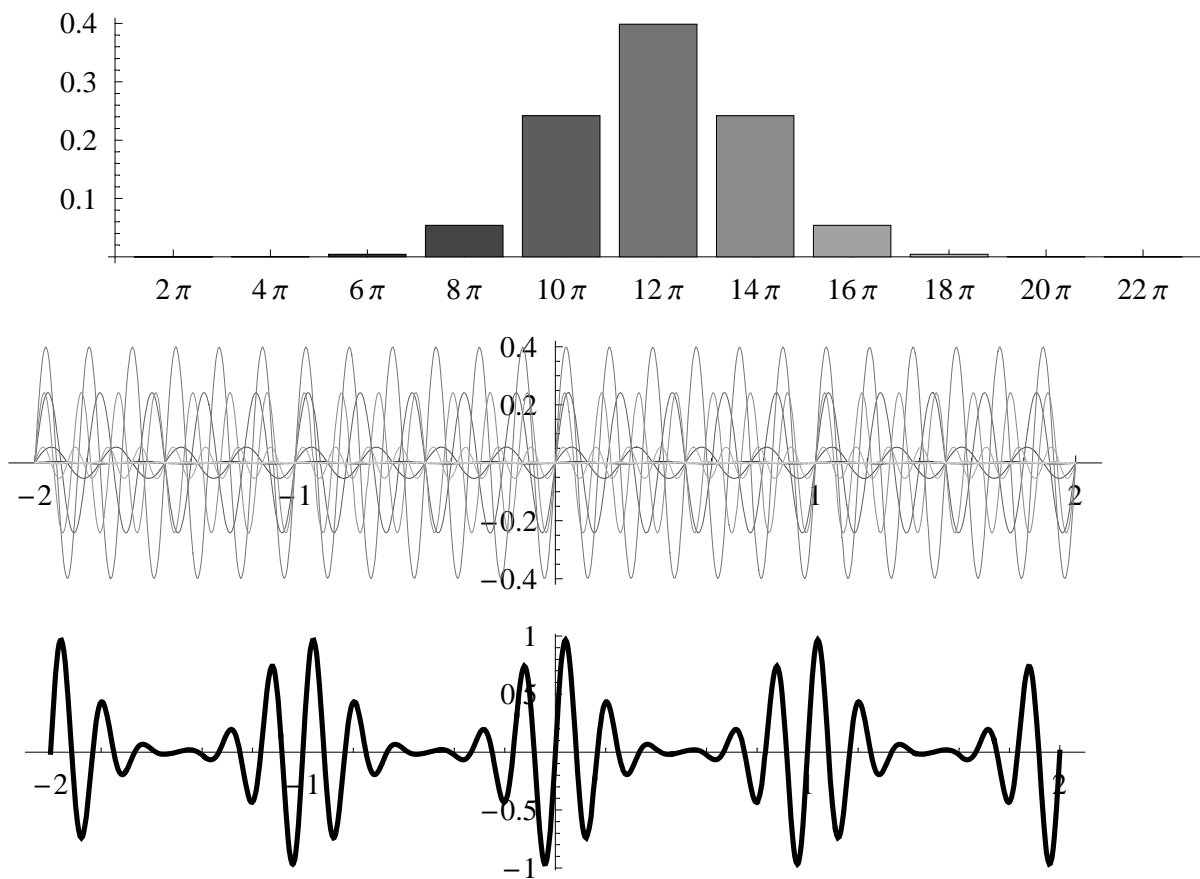
$$\Delta x = 1/3\pi, \Delta k = 3\pi, k_1 = \pi/8$$



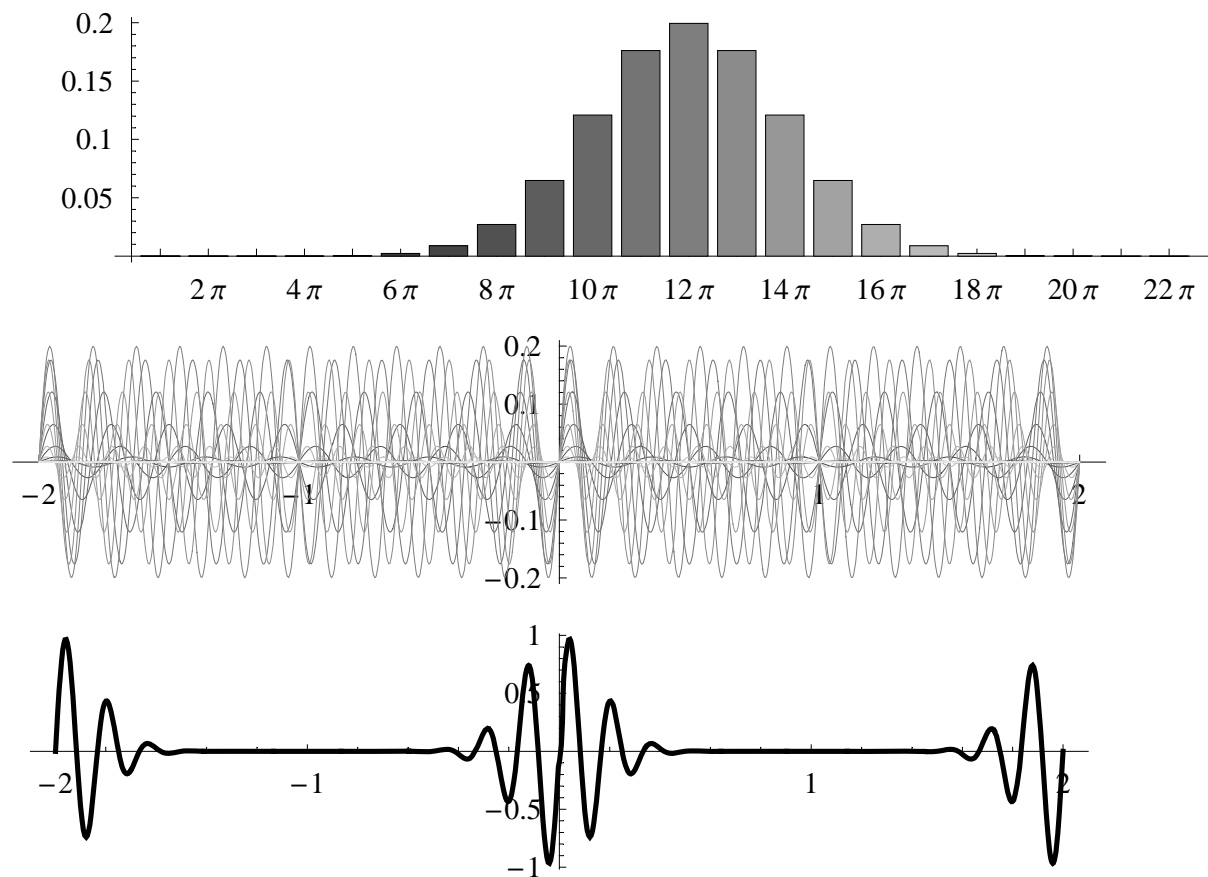
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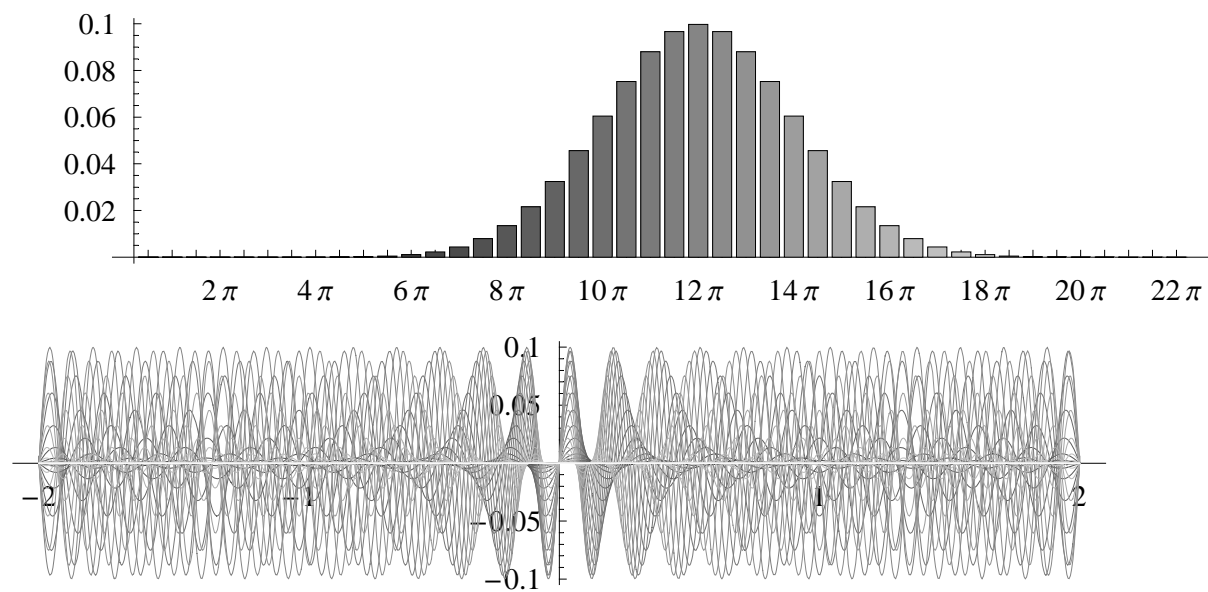
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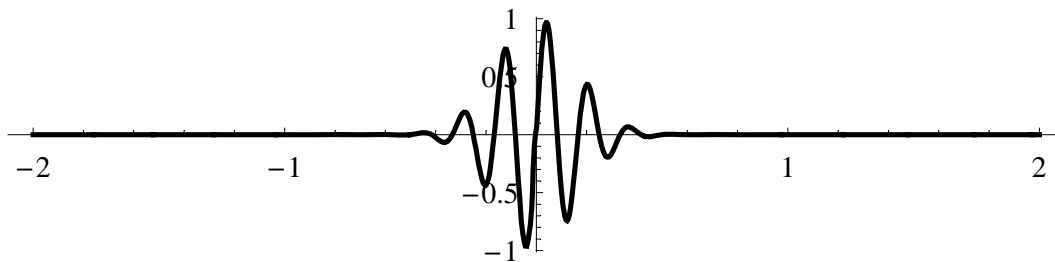


$$\Delta x = 1/2\pi, \Delta k = 2\pi, k_1 = \pi/2$$

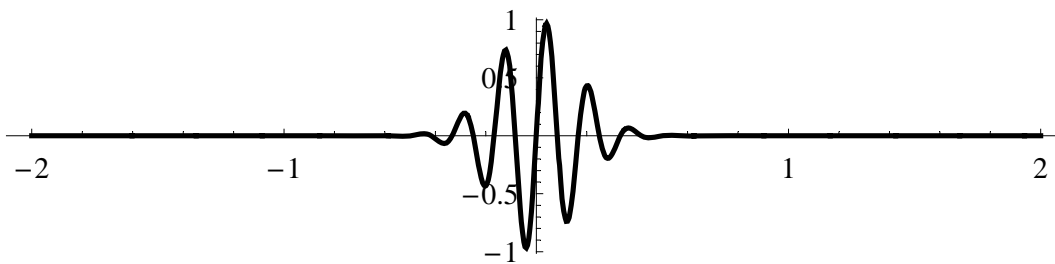
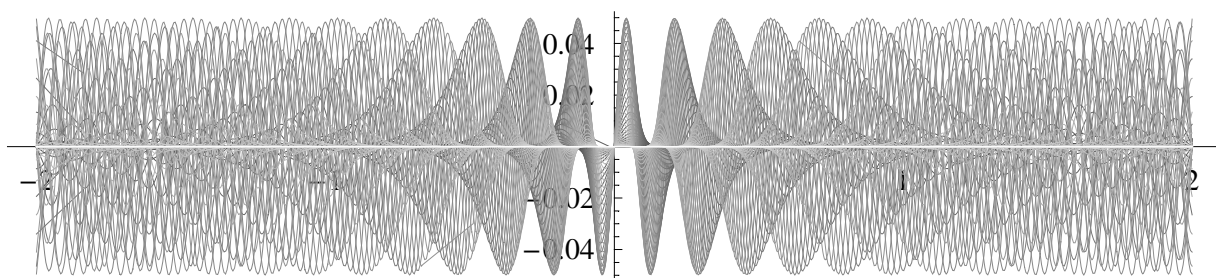
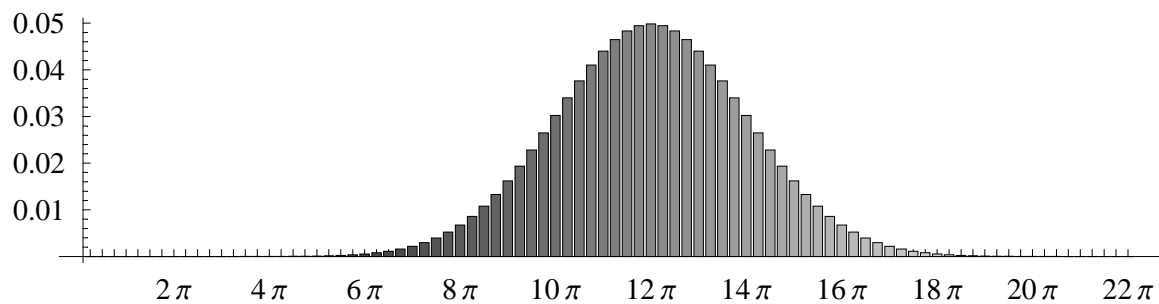


$$\Delta x = 1/2\pi, \Delta k = 2\pi, k_1 = \pi/4$$

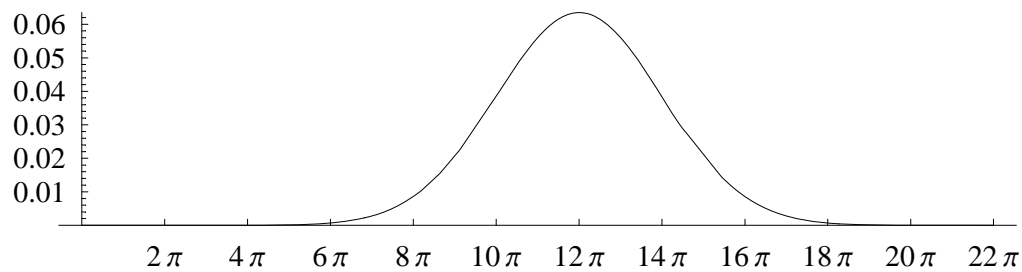


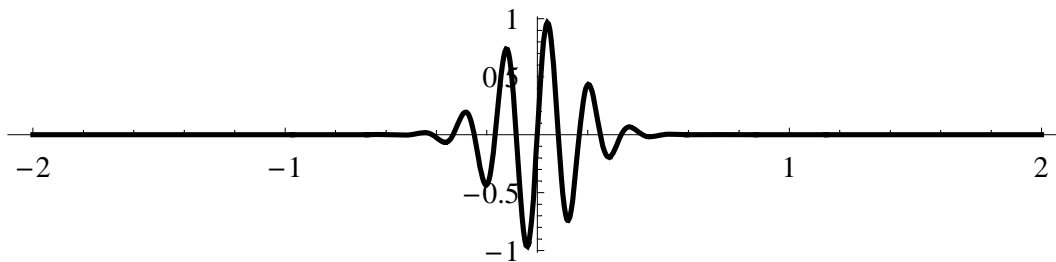


$$\Delta x = 1/2\pi, \Delta k = 2\pi, k_1 = \pi/8$$

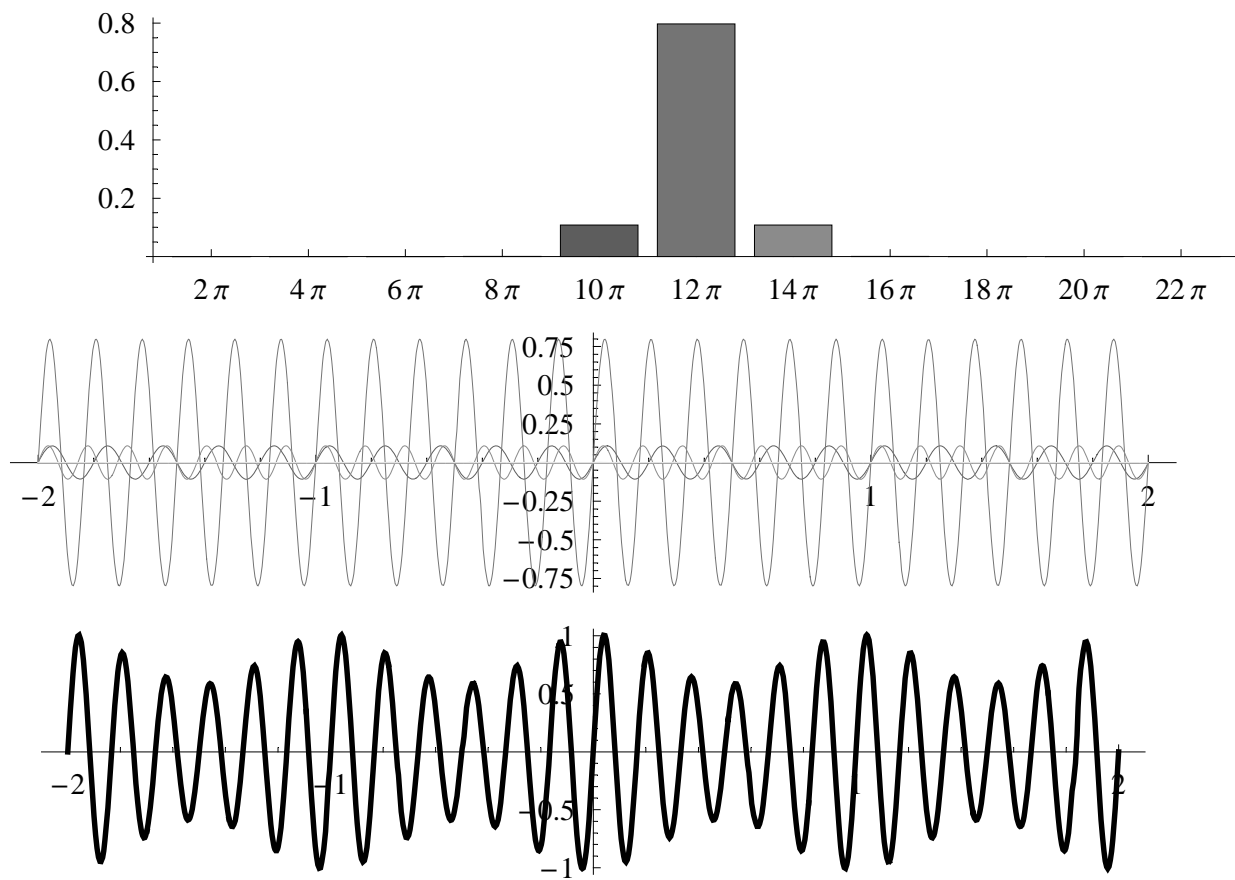


$$\Delta x = 1/2\pi, \Delta k = 2\pi, k_1 = 0$$

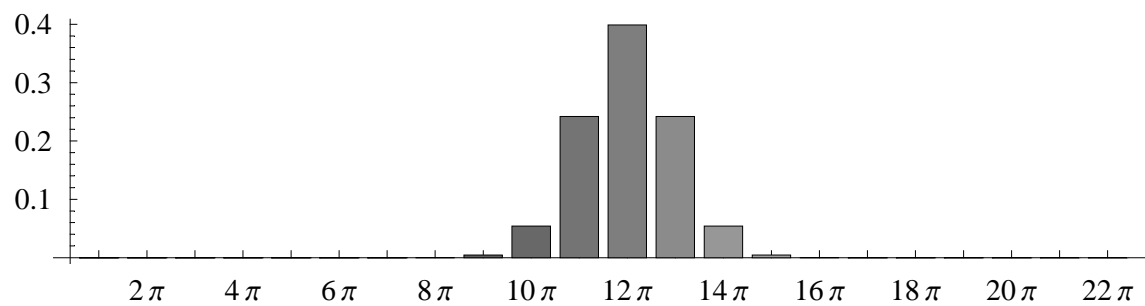


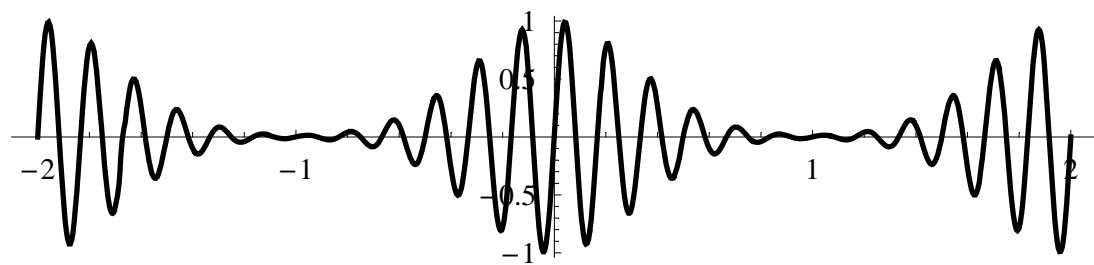
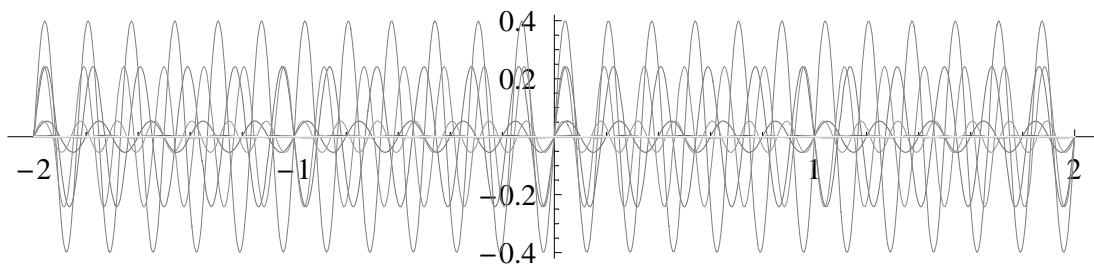


$$\Delta x = 1/1\pi, \Delta k = 1\pi, k_1 = \pi/1$$

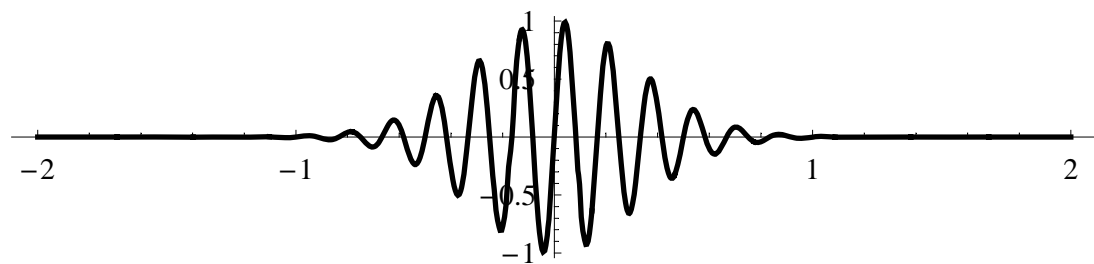
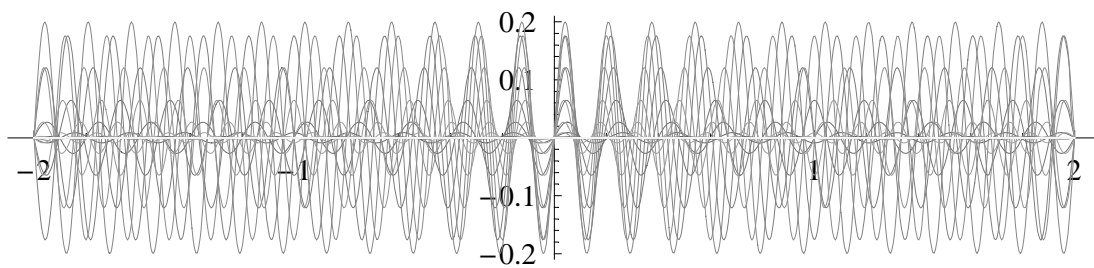
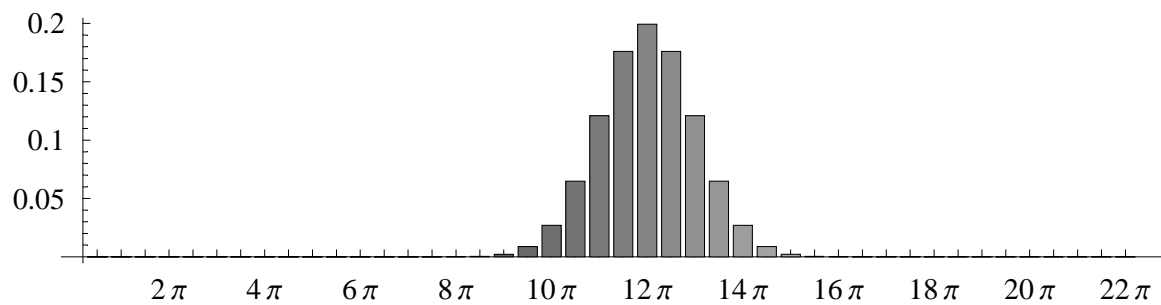


$$\Delta x = 1/1\pi, \Delta k = 1\pi, k_1 = \pi/2$$

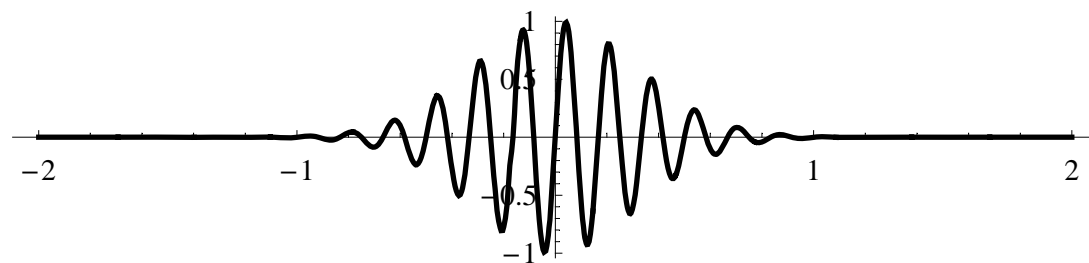
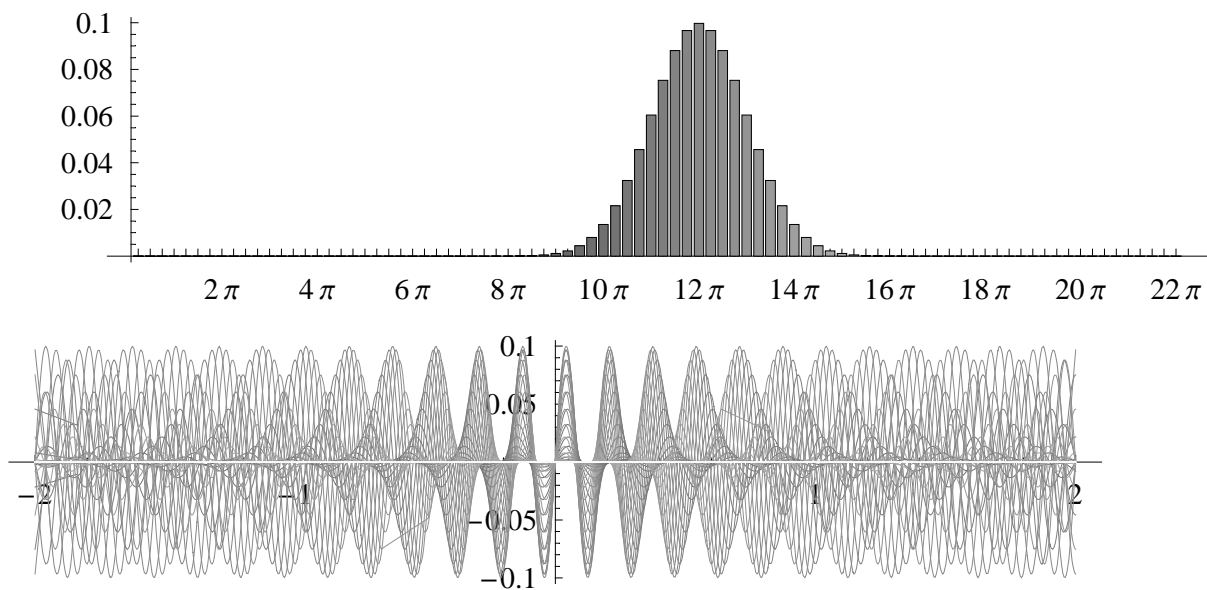




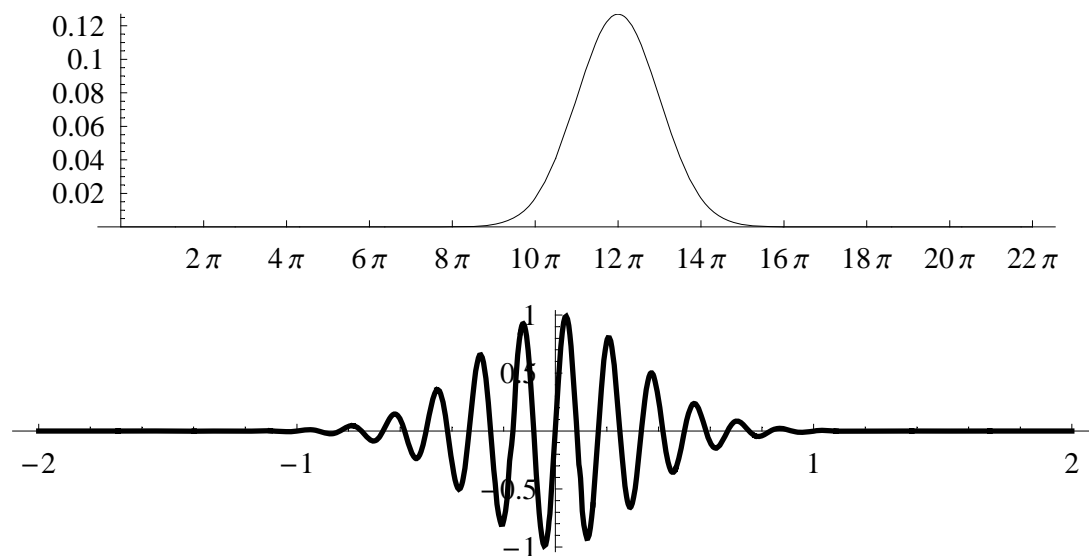
$$\Delta x = 1/1\pi, \Delta k = 1\pi, k_1 = \pi/4$$



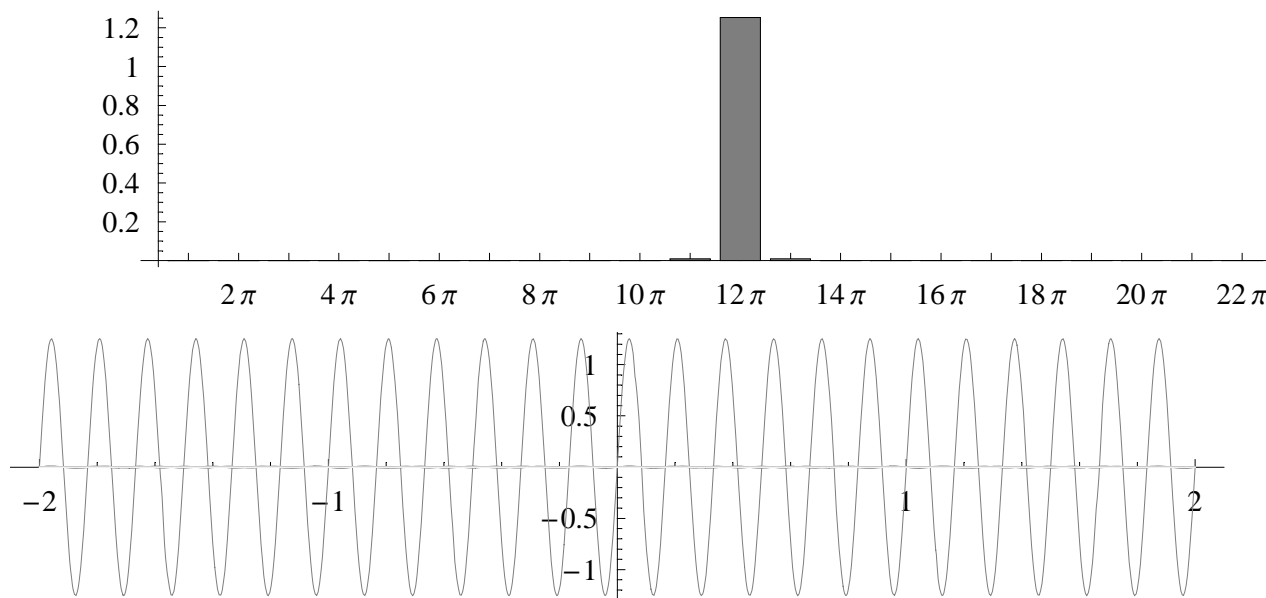
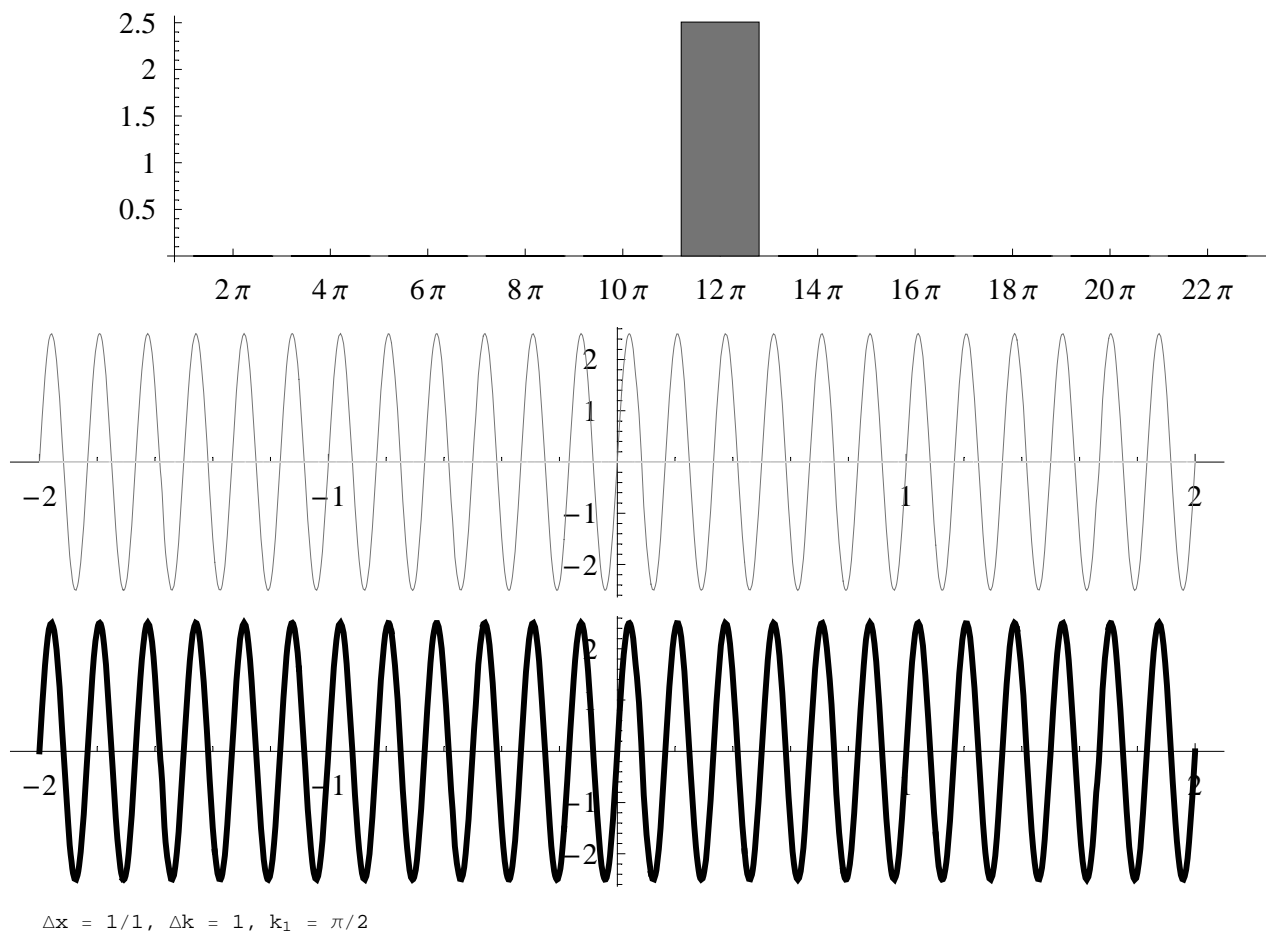
$$\Delta x = 1/1\pi, \Delta k = 1\pi, k_1 = \pi/8$$

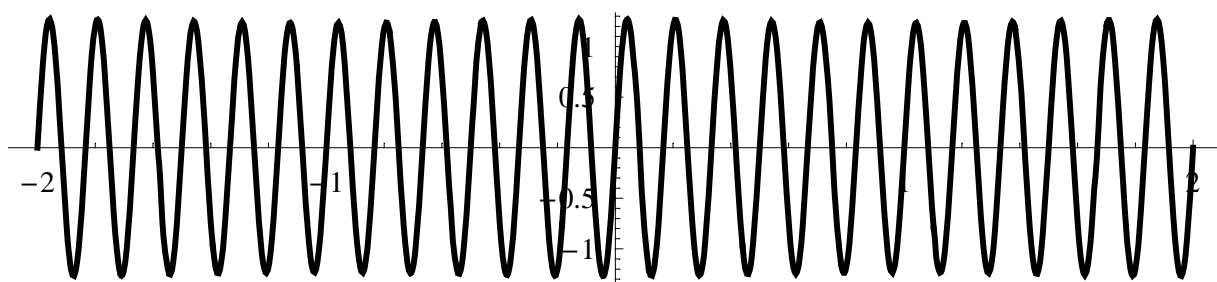


$$\Delta x = 1/1\pi, \Delta k = 1\pi, k_1 = 0$$

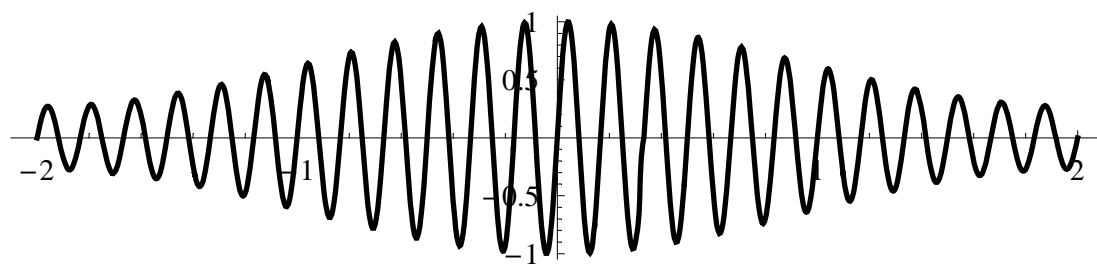
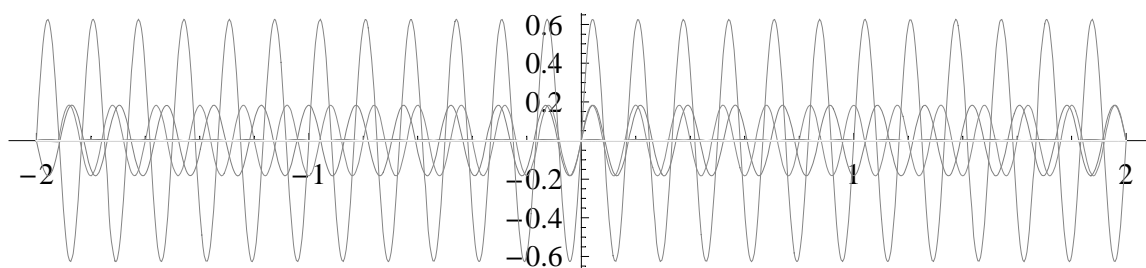
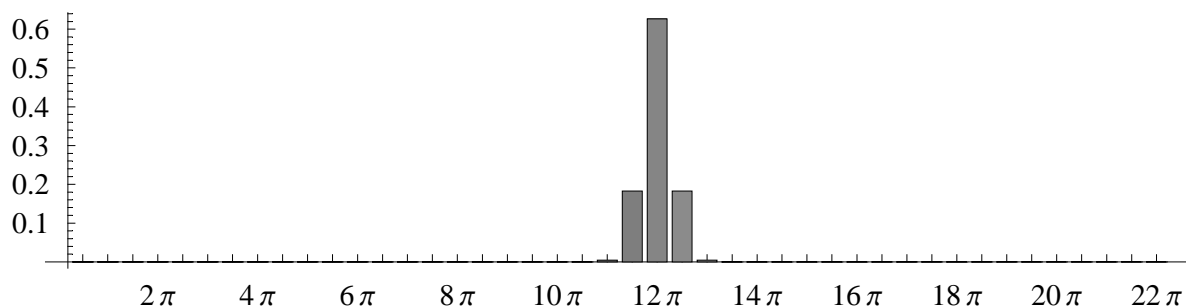


$$\Delta x = 1/1, \Delta k = 1, k_1 = \pi/1$$

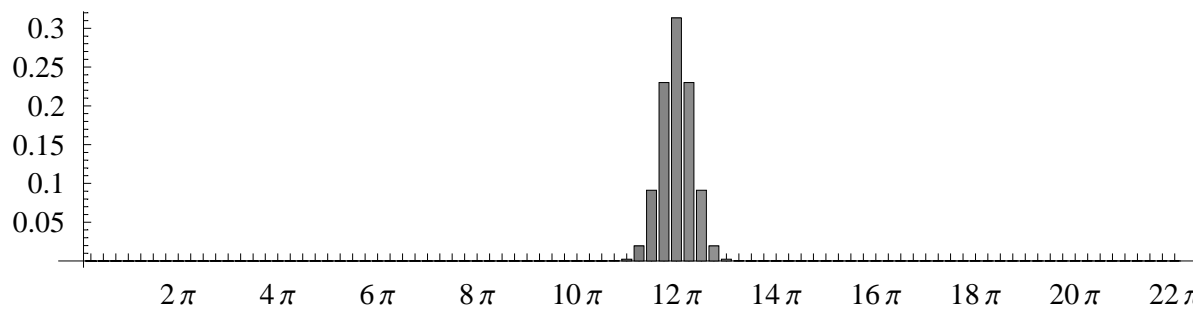


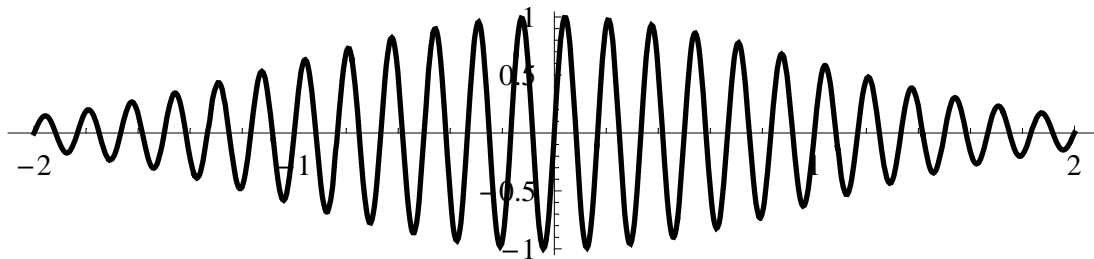
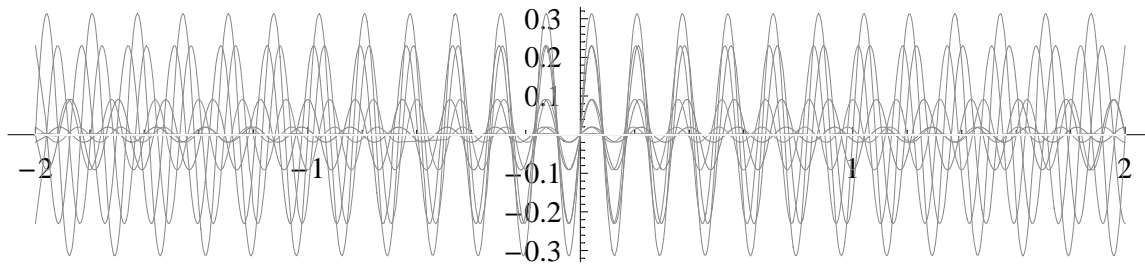


$$\Delta x = 1/1, \Delta k = 1, k_1 = \pi/4$$

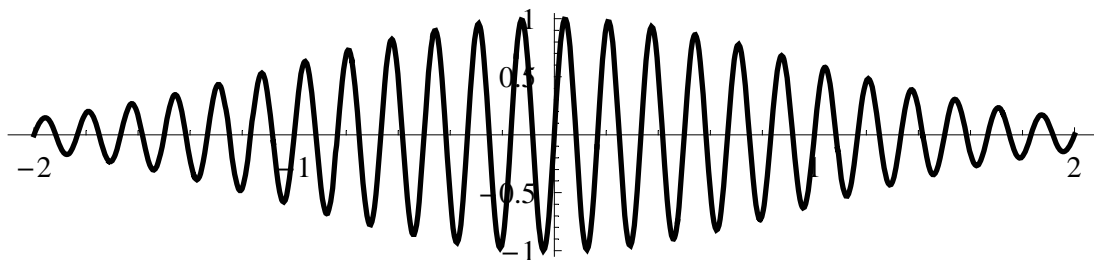
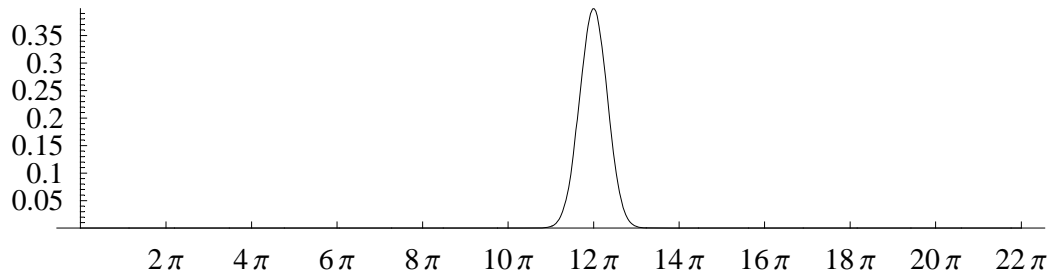


$$\Delta x = 1/1, \Delta k = 1, k_1 = \pi/8$$



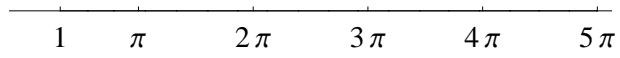


$\Delta x = 1/1$, $\Delta k = 1$, $k_1 = 0$



```
Plot[0, {k, 1, 5 π}, Ticks → {Append[Table[i π, {i, 5}], 1], None},
  Axes → {True, False}, Epilog → Text["Ticks for Δk slider", {3 π, .75}]];
Plot[0, {x, 1 / (5 π), 1}, Ticks → {Join[Table[i, {i, .2, 1, .2}], {1 / (5 π), 1 / π}], None},
  Axes → {True, False}, Epilog → Text["Ticks for Δx slider", {.5, .75}]];
```

Ticks for Δk slider



Ticks for Δx slider

