FIGURE 1

```
In[ ]:= Clear[e, σ]
        D[PDF[SkewNormalDistribution[1 + ζ * (e - 1), σ, 2], q], e]
```

$$\text{Out}[\ ]= -\frac{2\, e^{-\frac{5\,(-1+q-(-1+e)\,\zeta)^2}{2\,\sigma^2}}\,\zeta}{\pi\,\sigma^2} + \frac{e^{-\frac{(-1+q-(-1+e)\,\zeta)^2}{2\,\sigma^2}}\,\zeta\,(-1+q-(-1+e)\,\zeta)\,\text{Erfc}\left[-\frac{\sqrt{2}\,(-1+q-(-1+e)\,\zeta)}{\sigma}\right]}{\sqrt{2\,\pi}\,\sigma^3}$$

```
In[ ]:= Simplify[%]
```

$$\text{Out}[\ ]= \frac{e^{-\frac{5\,(-1+q+\zeta-e\,\zeta)^2}{2\,\sigma^2}}\,\zeta\left(-\frac{4\,\sigma}{\pi} + e^{\frac{2\,(-1+q+\zeta-e\,\zeta)^2}{\sigma^2}}\,\sqrt{\frac{2}{\pi}}\,(-1+q+\zeta-e\,\zeta)\,\text{Erfc}\left[-\frac{\sqrt{2}\,(-1+q+\zeta-e\,\zeta)}{\sigma}\right]\right)}{2\,\sigma^3}$$

In[ ]:=
```
e = 1
σ = 1
Plot[Table[(e^(-5 (-1+q+ξ-e ξ)^2/(2 σ^2)) ξ (-4 σ/π + e^(2 (-1+q+ξ-e ξ)^2/σ^2) Sqrt[2/π] (-1 + q + ξ - e ξ) Erfc[-Sqrt[2] (-1+q+ξ-e ξ)/σ]))/(2 σ^3) /
  PDF[SkewNormalDistribution[1, 1, 2], q], {ξ, 1, 2, 1}], {q, 1, 2},
 PlotStyle → {Directive[Thick, Black], Directive[Dashed, Black]}, PlotRange → {-3.2, 2.0},
 ImageSize → 650, PlotStyle → Thickness[0.008], AxesStyle → Directive[Black, 15]]
```

Out[ ]= 1

Out[ ]= 1

Out[ ]=

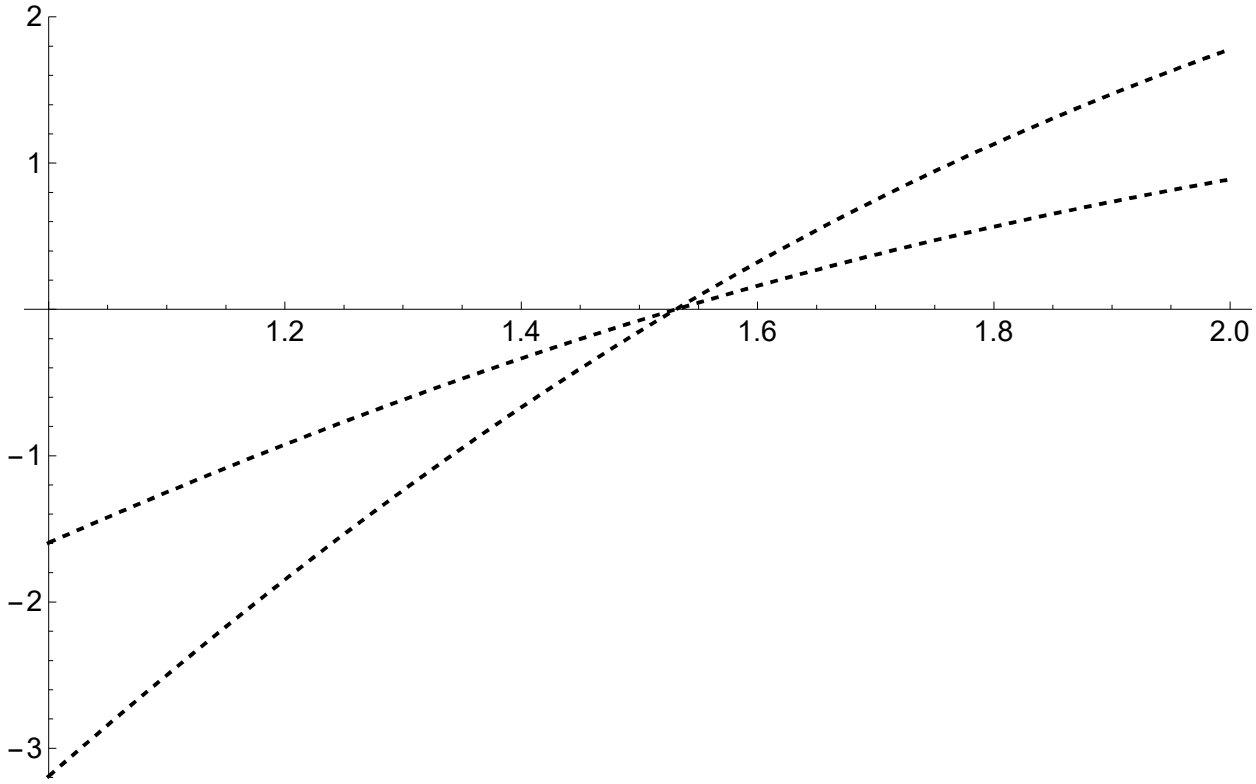


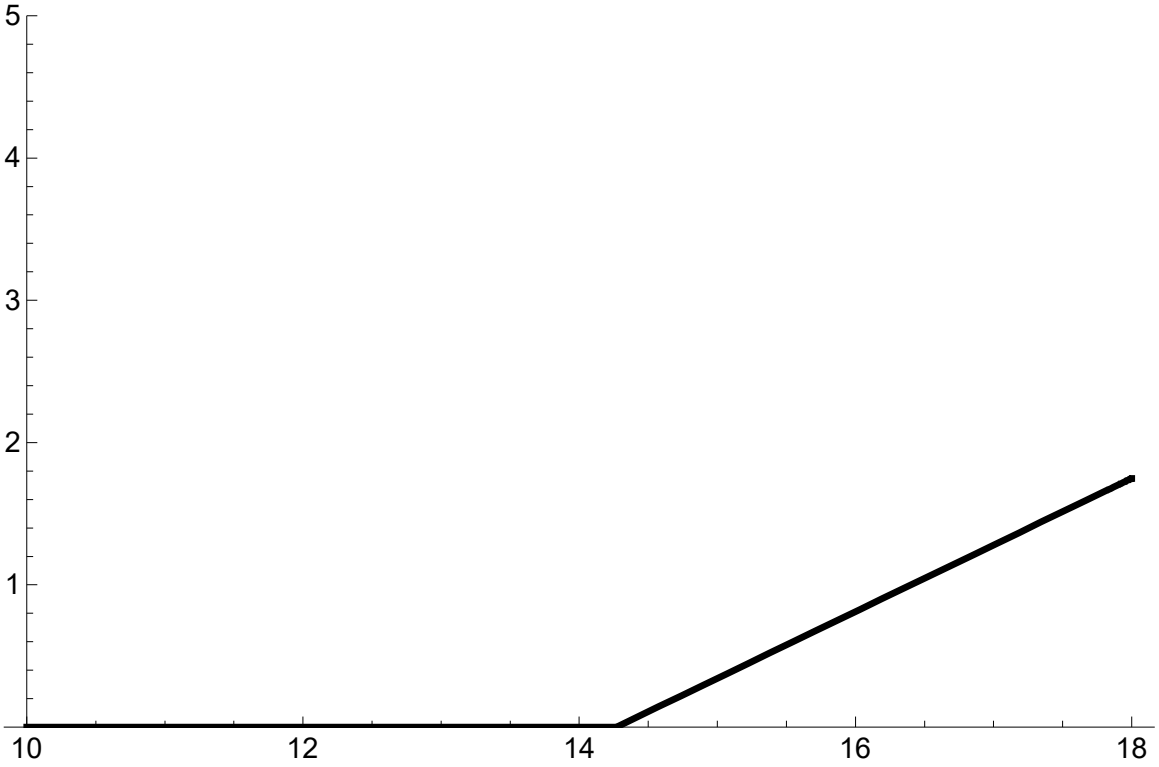
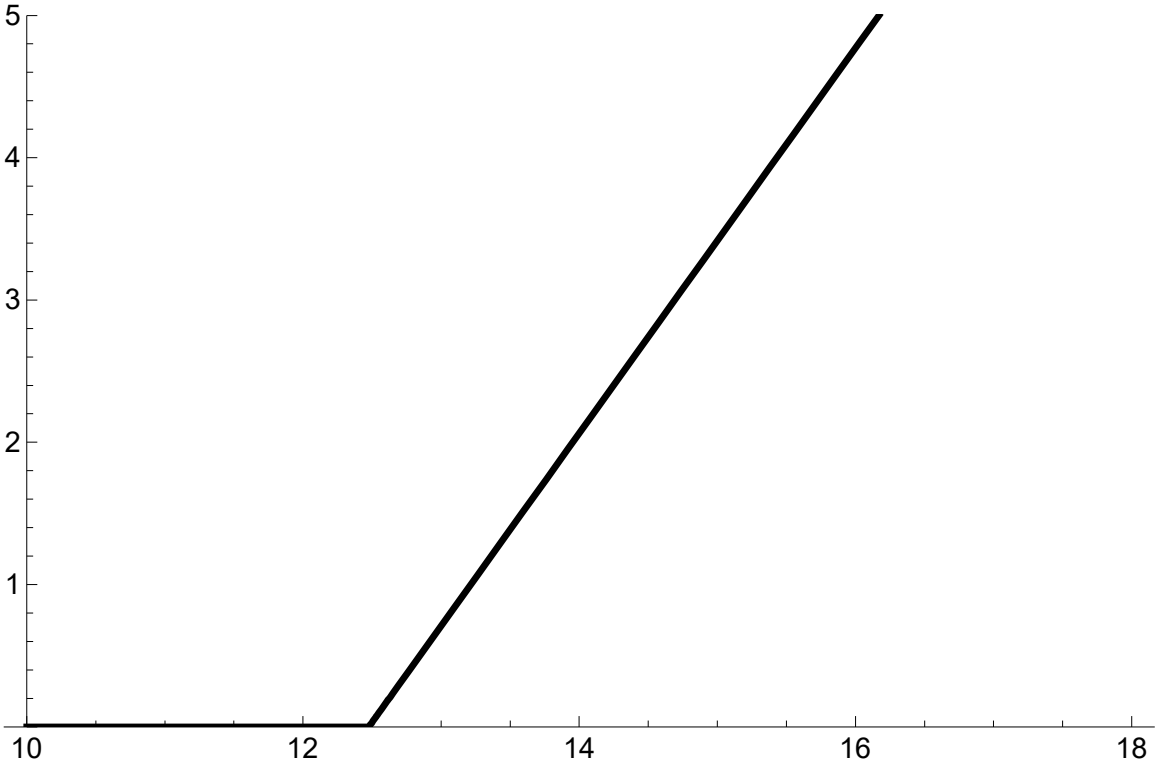
FIGURE 2

In[ ]:=
```
Clear[mu, yr, ye]
er = 10;
ee = 11;
or = 1.7;
oe = 1;
W = 2;
c = 0.1;
FindRoot[{mu * (yr - er)/or^2 == W, mu * (ye - ee)/oe^2 == W,
  0.25 * NIntegrate[Log[mu * (q - er)/or^2] * (E^(-((-er+q)^2/(2 or^2))) (-er + q))/(or^3 Sqrt[2 Pi]), {q, yr, 100}] +
   0.75 * NIntegrate[Log[mu * (q - ee)/oe^2] * (E^(-((-ee+q)^2/(2 oe^2))) (-ee + q))/(oe^3 Sqrt[2 Pi]), {q, ye, 100}] ==
  c}, {{mu, 1}, {yr, 15}, {ye, 15}}]
```

Out[ ]= {mu → 1.35421, yr → 14.2682, ye → 12.4769}

In[ ]:=
```
Clear[mu, yr, ye]
er = 10;
ee = 11;
or = 1.7;
oe = 1;
W = 2;
c = 0.1;
mu = 1.3542132774394764`;
yr = 14.268160781091089`;
ye = 12.476872242592073`;
Plot[Max[mu * (q - er)/or^2 - W, 0], {q, 10, 18}, PlotRange → {0, 5}, ImageSize → 600,
 PlotStyle → {Black, Thickness[0.006]}, AxesStyle → Directive[Black, 15]]
Plot[Max[mu * (q - ee)/oe^2 - W, 0], {q, 10, 18}, PlotRange → {0, 5}, ImageSize → 600,
 PlotStyle → {Black, Thickness[0.006]}, AxesStyle → Directive[Black, 15]]
```

Out[ ]=



Out[ ]=