Step A & B

Calculating A & B from b, f, ϵ and $\phi(0)$

In[19]:=
```
B[b_, f_, eps_, p_, phi0_] = Simplify[(b^2 f (1 + eps) - p - phi0 b (2 + eps)) / eps]
```

Out[19]=
$$-\frac{-b^2\,(1+\text{eps})\,f+p+b\,(2+\text{eps})\,\text{phi0}}{\text{eps}}$$

In[20]:=
```
D[B[b, f, eps, p, phi0], b]
```

Out[20]=
$$-\frac{-2\,b\,(1+\text{eps})\,f+(2+\text{eps})\,\text{phi0}}{\text{eps}}$$

In[21]:=
```
Simplify[D[B[b, f, eps, p, phi0], b] == (2 b (1 + eps) f - (2 + eps) phi0) / eps]
```

Out[21]=
```
True
```

In[22]:=
```
D[B[b, f, eps, p, phi0], f]
```

Out[22]=
$$\frac{b^2\,(1+\text{eps})}{\text{eps}}$$

In[23]:=
```
Simplify[D[B[b, f, eps, p, phi0], f] == b^2 (1 + eps) / eps]
```

Out[23]=
```
True
```

In[24]:=
```
Simplify[D[B[b, f, eps, p, phi0], eps]]
```

Out[24]=
$$\frac{-b^2\,f+p+2\,b\,\text{phi0}}{\text{eps}^2}$$

In[25]:=
```
Simplify[D[B[b, f, eps, p, phi0], eps] == (p + 2 b phi0 - b^2 f) / eps^2]
```

Out[25]=
```
True
```

In[26]:=
```
Simplify[D[B[b, f, eps, p, phi0], p]]
```

Out[26]=
$$-\frac{1}{\text{eps}}$$

In[27]:=
```
Simplify[D[B[b, f, eps, p, phi0], p] == -1 / eps]
```

Out[27]=
```
True
```

In[28]:=
```
Simplify[D[B[b, f, eps, p, phi0], phi0]]
```

Out[28]=
$$-\frac{b\,(2+\text{eps})}{\text{eps}}$$

In[29]:=
```
Simplify[D[B[b, f, eps, p, phi0], phi0] == -b (2 + eps) / eps]
```

Out[29]=
```
True
```

In[30]:=
```
A[B_, b_, phi0_, f_, eps_] = (B / b + phi0 - b f) (1 + eps) / eps
```

Out[30]=
$$\frac{(1+\text{eps})\left(\frac{B}{b}-b\,f+\text{phi0}\right)}{\text{eps}}$$

In[31]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], b]]
```

Out[31]=
$$-\frac{(1+\text{eps})\left(\text{Bb}[b,\,f,\,\text{eps},\,p,\,\text{phi0}]+b\left(b\,f-\text{Bb}^{(1,0,0,0,0)}[b,\,f,\,\text{eps},\,p,\,\text{phi0}]\right)\right)}{b^2\,\text{eps}}$$

In[32]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], phi0]]
```

Out[32]=
$$\frac{(1+\text{eps})\left(b+\text{Bb}^{(0,0,0,0,1)}[b,\,f,\,\text{eps},\,p,\,\text{phi0}]\right)}{b\,\text{eps}}$$

In[33]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], phi0] ==
  (1 + eps) / eps (b + D[Bb[b, f, eps, p, phi0], phi0]) / b]
```

Out[33]= True

In[34]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], b]]
```

Out[34]=
$$-\frac{(1+\text{eps})\left(\text{Bb}[b,\,f,\,\text{eps},\,p,\,\text{phi0}]+b\left(b\,f-\text{Bb}^{(1,0,0,0,0)}[b,\,f,\,\text{eps},\,p,\,\text{phi0}]\right)\right)}{b^2\,\text{eps}}$$

In[35]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], b] ==
  (1 + eps) / eps (D[Bb[b, f, eps, p, phi0], b] / b - (Bb[b, f, eps, p, phi0] / b^2 + f))]
```

Out[35]= True

In[36]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], f]]
```

Out[36]=
$$\frac{(1+\text{eps})\left(-b+\frac{\text{Bb}^{(0,1,0,0,0)}[b,f,\text{eps},p,\text{phi0}]}{b}\right)}{\text{eps}}$$

In[37]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], f] ==
  (1 + eps) / eps (D[Bb[b, f, eps, p, phi0], f] - b^2) / b]
```

Out[37]= True

In[38]:=
```
D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], p]
```

Out[38]=
$$\frac{(1+\text{eps})\,\text{Bb}^{(0,0,0,1,0)}[b,\,f,\,\text{eps},\,p,\,\text{phi0}]}{b\,\text{eps}}$$

In[39]:=
```
Simplify[
 D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], p] == 1/b D[Bb[b, f, eps, p, phi0], p] (1 + eps)/eps]
```

Out[39]= True

In[40]:=
```
D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], eps]
```

Out[40]=
$$\frac{-b\,f+\text{phi0}+\frac{\text{Bb}[b,f,\text{eps},p,\text{phi0}]}{b}}{\text{eps}}-\frac{(1+\text{eps})\left(-b\,f+\text{phi0}+\frac{\text{Bb}[b,f,\text{eps},p,\text{phi0}]}{b}\right)}{\text{eps}^2}+\frac{(1+\text{eps})\,\text{Bb}^{(0,0,1,0,0)}[b,f,\text{eps},p,\text{phi0}]}{b\,\text{eps}}$$

In[43]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], eps] ==
 (-b f + phi0 + Bb[b,f,eps,p,phi0]/b)/eps (-1/eps) + (1 + eps)/eps D[Bb[b, f, eps, p, phi0], eps]/b]
```

Out[43]= True

In[55]:=
```
Simplify[D[A[Bb[b, f, eps, p, phi0], b, phi0, f, eps], eps] ==
 (-A[Bb[b, f, eps, p, phi0], b, phi0, f, eps])/(eps (1 + eps)) + (1 + eps)/eps D[Bb[b, f, eps, p, phi0], eps]/b]
```

Out[55]= True