Rules for integrands of the form $(a + b\,\mathrm{Sin}[e + f\,x])^m\,(c + d\,\mathrm{Sin}[e + f\,x])^n\,(A + B\,\mathrm{Sin}[e + f\,x])$

1: $\int \mathrm{Sin}[e + f\,x]^n\,(a + b\,\mathrm{Sin}[e + f\,x])^m\,(A + B\,\mathrm{Sin}[e + f\,x])\,dx$ when $A\,b + a\,B == 0 \land a^2 - b^2 == 0 \land m \in \mathbb{Z} \land n \in \mathbb{Z}$

Derivation: Algebraic expansion

Rule: If $A\,b + a\,B == 0 \land a^2 - b^2 == 0 \land m \in \mathbb{Z} \land n \in \mathbb{Z}$, then

$$\int \mathrm{Sin}[e + f\,x]^n\,(a + b\,\mathrm{Sin}[e + f\,x])^m\,(A + B\,\mathrm{Sin}[e + f\,x])\,dx \longrightarrow \int \mathrm{ExpandTrig}\left[\mathrm{Sin}[e + f\,x]^n\,(a + b\,\mathrm{Sin}[e + f\,x])^m\,(A + B\,\mathrm{Sin}[e + f\,x]),\,x\right]dx$$

Program code:

```
Int[sin[e_.+f_.*x_]^n_.*(a_+b_.*sin[e_.+f_.*x_])^m_.*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  Int[ExpandTrig[sin[e+f*x]^n*(a+b*sin[e+f*x])^m*(A+B*sin[e+f*x]),x],x] /;
FreeQ[{a,b,e,f,A,B},x] && EqQ[A*b+a*B,0] && EqQ[a^2-b^2,0] && IntegerQ[m] && IntegerQ[n]
```

2: $\int (a + b\,\mathrm{Sin}[e + f\,x])^m\,(c + d\,\mathrm{Sin}[e + f\,x])^n\,(A + B\,\mathrm{Sin}[e + f\,x])\,dx$ when $b\,c + a\,d == 0 \land a^2 - b^2 == 0 \land m \in \mathbb{Z}$

Derivation: Algebraic simplification

Basis: If $b\,c + a\,d == 0 \land a^2 - b^2 == 0$, then $(a + b\,\mathrm{Sin}[z])\,(c + d\,\mathrm{Sin}[z]) == a\,c\,\mathrm{Cos}[z]^2$

Rule: If $b\,c + a\,d == 0 \land a^2 - b^2 == 0 \land m \in \mathbb{Z}$, then

$$\int (a + b\,\mathrm{Sin}[e + f\,x])^m\,(c + d\,\mathrm{Sin}[e + f\,x])^n\,(A + B\,\mathrm{Sin}[e + f\,x])\,dx \longrightarrow a^m\,c^m \int \mathrm{Cos}[e + f\,x]^{2m}\,(c + d\,\mathrm{Sin}[e + f\,x])^{n-m}\,(A + B\,\mathrm{Sin}[e + f\,x])\,dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_.*(c_+d_.*sin[e_.+f_.*x_])^n_.*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  a^m*c^m*Int[Cos[e+f*x]^(2*m)*(c+d*Sin[e+f*x])^(n-m)*(A+B*Sin[e+f*x]),x] /;
FreeQ[{a,b,c,d,e,f,A,B,n},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0] && IntegerQ[m] && Not[IntegerQ[n] && (LtQ[m,0] && GtQ[n,0] || LtQ[0
```

3: $\int (a + b \operatorname{Sin}[e + f x])^m (c + d \operatorname{Sin}[e + f x]) (A + B \operatorname{Sin}[e + f x]) \, dx$ when $b c - a d \neq 0$

Derivation: Algebraic expansion

Rule: If $b c - a d \neq 0$, then

$$\int (a + b \operatorname{Sin}[e + f x])^m (c + d \operatorname{Sin}[e + f x]) (A + B \operatorname{Sin}[e + f x]) \, dx \to \int (a + b \operatorname{Sin}[e + f x])^m \left(A c + (B c + A d) \operatorname{Sin}[e + f x] + B d \operatorname{Sin}[e + f x]^2\right) dx$$

Program code:

```
Int[(a_.+b_.*sin[e_.+f_.*x_])^m_.*(c_.+d_.*sin[e_.+f_.*x_])*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  Int[(a+b*Sin[e+f*x])^m*(A*c+(B*c+A*d)*Sin[e+f*x]+B*d*Sin[e+f*x]^2),x] /;
FreeQ[{a,b,c,d,e,f,A,B,m},x] && NeQ[b*c-a*d,0]
```

4. $\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c+a\,d==0\,\wedge\,a^2-b^2==0\,\wedge\,m\notin\mathbb{Z}\,\wedge\,n\notin\mathbb{Z}$

1. $\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c+a\,d==0\,\wedge\,a^2-b^2==0\,\wedge\,m\notin\mathbb{Z}\,\wedge\,n\notin\mathbb{Z}\,\wedge\,A\,b\,(m+n+1)+a\,B\,(m-n)==0$

1: $\int \frac{A+B\,\text{Sin}[e+f\,x]}{\sqrt{a+b\,\text{Sin}[e+f\,x]}\,\sqrt{c+d\,\text{Sin}[e+f\,x]}}\,dx$ when $b\,c+a\,d==0\,\wedge\,a^2-b^2==0$

Derivation: Algebraic expansion

Basis: If $b\,c+a\,d==0\,\wedge\,a^2-b^2==0$, then $b\,c+a\,d==0$

Basis: If $b\,c+a\,d==0$, then $\frac{A+B\,z}{\sqrt{a+b\,z}\,\sqrt{c+d\,z}}==\frac{(A\,b+a\,B)\,\sqrt{a+b\,z}}{2\,a\,b\,\sqrt{c+d\,z}}+\frac{(B\,c+A\,d)\,\sqrt{c+d\,z}}{2\,c\,d\,\sqrt{a+b\,z}}$

Rule: If $b\,c+a\,d==0\,\wedge\,a^2-b^2==0$, then

$$\int \frac{A+B\,\text{Sin}[e+f\,x]}{\sqrt{a+b\,\text{Sin}[e+f\,x]}\,\sqrt{c+d\,\text{Sin}[e+f\,x]}}\,dx\rightarrow\frac{A\,b+a\,B}{2\,a\,b}\int\frac{\sqrt{a+b\,\text{Sin}[e+f\,x]}}{\sqrt{c+d\,\text{Sin}[e+f\,x]}}\,dx+\frac{B\,c+A\,d}{2\,c\,d}\int\frac{\sqrt{c+d\,\text{Sin}[e+f\,x]}}{\sqrt{a+b\,\text{Sin}[e+f\,x]}}\,dx$$

Program code:

```
Int[(A_.+B_.*sin[e_.+f_.*x_])/(Sqrt[a_+b_.*sin[e_.+f_.*x_]]*Sqrt[c_+d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  (A*b+a*B)/(2*a*b)*Int[Sqrt[a+b*Sin[e+f*x]]/Sqrt[c+d*Sin[e+f*x]],x] +
  (B*c+A*d)/(2*c*d)*Int[Sqrt[c+d*Sin[e+f*x]]/Sqrt[a+b*Sin[e+f*x]],x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0]
```

2:

$$\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx \text{ when } b\,c+a\,d==0 \land a^2-b^2==0 \land m\notin\mathbb{Z} \land n\notin\mathbb{Z} \land A\,b\,(m+n+1)+a\,B\,(m-n)==0 \land m\neq-\tfrac{1}{2}$$

Derivation: Algebraic expansion and doubly degenerate sine recurrence 1c with $p \to 0$ and $A\,b\,(m+n+1)+a\,B\,(m-n)==0$

Basis: $A+B\,z==\frac{A\,b-a\,B}{b}+\frac{B\,(a+b\,z)}{b}$

Rule: If $b\,c+a\,d==0 \land a^2-b^2==0 \land A\,b\,(m+n+1)+a\,B\,(m-n)==0 \land m\notin\mathbb{Z} \land m\neq-\frac{1}{2}$, then

$$\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx \longrightarrow -\frac{B\,\text{Cos}[e+f\,x]\,(a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n}{f\,(m+n+1)}$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_+d_.*sin[e_.+f_.*x_])^n_.*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -B*Cos[e+f*x]*(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^n/(f*(m+n+1)) /;
FreeQ[{a,b,c,d,e,f,A,B,m,n},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0] && EqQ[A*b*(m+n+1)+a*B*(m-n),0] && NeQ[m,-1/2]
```

2: $\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,\left(c+d\,\text{Sin}[e+f\,x]\right)^n\,\left(A+B\,\text{Sin}[e+f\,x]\right)\,dx$ when $b\,c+a\,d==0\,\land\,a^2-b^2==0$

Derivation: Algebraic expansion

Baisi: $A+B\,z==\frac{B\,(c+d\,z)}{d}-\frac{B\,c-A\,d}{d}$

Rule: If $b\,c+a\,d==0\,\land\,a^2-b^2==0$, then

$$\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,\left(c+d\,\text{Sin}[e+f\,x]\right)^n\,\left(A+B\,\text{Sin}[e+f\,x]\right)\,dx\,\rightarrow$$
$$\frac{B}{d}\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,\left(c+d\,\text{Sin}[e+f\,x]\right)^{n+1}\,dx-\frac{B\,c-A\,d}{d}\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,\left(c+d\,\text{Sin}[e+f\,x]\right)^n\,dx$$

Program code:

```
Int[Sqrt[a_.+b_.*sin[e_.+f_.*x_]]*(c_+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  B/d*Int[Sqrt[a+b*Sin[e+f*x]]*(c+d*Sin[e+f*x])^(n+1),x] -
  (B*c-A*d)/d*Int[Sqrt[a+b*Sin[e+f*x]]*(c+d*Sin[e+f*x])^n,x] /;
FreeQ[{a,b,c,d,e,f,A,B,n},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0]
```

3: $\int (a + b\,\mathrm{Sin}[e + f\,x])^m\, (c + d\,\mathrm{Sin}[e + f\,x])^n\, (A + B\,\mathrm{Sin}[e + f\,x])\, dx$ when $b\,c + a\,d == 0 \land a^2 - b^2 == 0 \land m < -\frac{1}{2}$

Derivation: Algebraic expansion and doubly degenerate sine recurrence 1c with $p \to 0$

Basis: $A + B\,z == \frac{A\,b - a\,B}{b} + \frac{B\,(a + b\,z)}{b}$

Rule: If $b\,c + a\,d == 0 \land a^2 - b^2 == 0 \land m < -\frac{1}{2}$, then

$$\int (a + b\,\mathrm{Sin}[e + f\,x])^m\, (c + d\,\mathrm{Sin}[e + f\,x])^n\, (A + B\,\mathrm{Sin}[e + f\,x])\, dx \longrightarrow$$

$$\frac{(A\,b - a\,B)\,\mathrm{Cos}[e + f\,x]\, (a + b\,\mathrm{Sin}[e + f\,x])^m\, (c + d\,\mathrm{Sin}[e + f\,x])^n}{a\,f\,(2\,m + 1)} + \frac{a\,B\,(m - n) + A\,b\,(m + n + 1)}{a\,b\,(2\,m + 1)} \int (a + b\,\mathrm{Sin}[e + f\,x])^{m+1}\, (c + d\,\mathrm{Sin}[e + f\,x])^n\, dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_+d_.*sin[e_.+f_.*x_])^n_.*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  (A*b-a*B)*Cos[e+f*x]*(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^n/(a*f*(2*m+1)) +
  (a*B*(m-n)+A*b*(m+n+1))/(a*b*(2*m+1))*Int[(a+b*Sin[e+f*x])^(m+1)*(c+d*Sin[e+f*x])^n,x] /;
FreeQ[{a,b,c,d,e,f,A,B,m,n},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0] && (LtQ[m,-1/2] || ILtQ[m+n,0] && Not[SumSimplerQ[n,1]]) && NeQ[2
```

4: $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c+a\,d==0\,\land\,a^2-b^2==0\,\land\,m\nless-\frac{1}{2}$

Derivation: Algebraic expansion and doubly degenerate sine recurrence 1b with $m\to m+1,\ p\to 0$

Basis: $A+B\,z==\frac{A\,b-a\,B}{b}+\frac{B\,(a+b\,z)}{b}$

Rule: If $b\,c+a\,d==0\,\land\,a^2-b^2==0\,\land\,m\nless-\frac{1}{2}$, then

$$\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx\;\longrightarrow$$

$$-\frac{B\,\mathrm{Cos}[e+f\,x]\,(a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n}{f\,(m+n+1)}-\frac{B\,c\,(m-n)-A\,d\,(m+n+1)}{d\,(m+n+1)}\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_.*(c_+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -B*Cos[e+f*x]*(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^n/(f*(m+n+1)) -
  (B*c*(m-n)-A*d*(m+n+1))/(d*(m+n+1))*Int[(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^n,x] /;
FreeQ[{a,b,c,d,e,f,A,B,m,n},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0] && Not[LtQ[m,-1/2]] && NeQ[m+n+1,0]
```

5. $\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2=0\,\land\,c^2-d^2\neq 0$

1: $\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$

when $b\,c-a\,d\neq 0\,\land\,a^2-b^2=0\,\land\,c^2-d^2\neq 0\,\land\,m+n+2=0\,\land\,A\,(a\,d\,m+b\,c\,(n+1))-B\,(a\,c\,m+b\,d\,(n+1))=0$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2=0\,\land\,c^2-d^2\neq 0\,\land$ $m+n+2=0\,\land\,A\,(a\,d\,m+b\,c\,(n+1))-B\,(a\,c\,m+b\,d\,(n+1))=0$, then

$$\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx\,\rightarrow$$
$$\frac{(B\,c-A\,d)\,\text{Cos}[e+f\,x]\,(a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^{n+1}}{f\,(n+1)\,(c^2-d^2)}$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  (B*c-A*d)*Cos[e+f*x]*(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^(n+1)/(f*(n+1)*(c^2-d^2)) /;
FreeQ[{a,b,c,d,e,f,A,B,m,n},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && EqQ[m+n+2,0] && EqQ[A*(a*d*m+b*c*(n+1))-B*(a
```

2. $\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2=0\,\land\,c^2-d^2\neq 0\,\land\,m>\frac{1}{2}$

1: $\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2=0\,\land\,c^2-d^2\neq 0\,\land\,m>\frac{1}{2}\,\land\,n<-1$

Derivation: Singly degenerate sine recurrence 1a with $p\to 0$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2=0\,\land\,c^2-d^2\neq 0\,\land\,m>\frac{1}{2}\,\land\,n<-1$, then

$$\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx\,\rightarrow$$
$$-\left(\left(b^2\,(B\,c-A\,d)\,\text{Cos}[e+f\,x]\,(a+b\,\text{Sin}[e+f\,x])^{m-1}\,(c+d\,\text{Sin}[e+f\,x])^{n+1}\right)/(d\,f\,(n+1)\,(b\,c+a\,d))\right)-$$
$$\frac{b}{d\,(n+1)\,(b\,c+a\,d)}\int (a+b\,\text{Sin}[e+f\,x])^{m-1}\,(c+d\,\text{Sin}[e+f\,x])^{n+1}\,\cdot$$

$$\left(a A d (m-n-2) - B \left(a c (m-1) + b d (n+1)\right) - \left(A b d (m+n+1) - B \left(b c m - a d (n+1)\right)\right) \mathrm{Sin}[e+f x]\right) dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -b^2*(B*c-A*d)*Cos[e+f*x]*(a+b*Sin[e+f*x])^(m-1)*(c+d*Sin[e+f*x])^(n+1)/(d*f*(n+1)*(b*c+a*d)) -
  b/(d*(n+1)*(b*c+a*d))*Int[(a+b*Sin[e+f*x])^(m-1)*(c+d*Sin[e+f*x])^(n+1)*
    Simp[a*A*d*(m-n-2)-B*(a*c*(m-1)+b*d*(n+1))-(A*b*d*(m+n+1)-B*(b*c*m-a*d*(n+1)))*Sin[e+f*x],x],x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && GtQ[m,1/2] && LtQ[n,-1] &&
  IntegerQ[2*m] && (IntegerQ[2*n] || EqQ[c,0])
```

2: $\int (a+b\,\mathrm{Sin}[e+f x])^m (c+d\,\mathrm{Sin}[e+f x])^n (A+B\,\mathrm{Sin}[e+f x])\, dx$ when $b c - a d \neq 0 \land a^2 - b^2 == 0 \land c^2 - d^2 \neq 0 \land m > \frac{1}{2} \land n \nless -1$

Derivation: Singly degenerate sine recurrence 1b with $p \to 0$

Rule: If $b c - a d \neq 0 \land a^2 - b^2 == 0 \land c^2 - d^2 \neq 0 \land m > \frac{1}{2} \land n \nless -1$, then

$$\int (a+b\,\mathrm{Sin}[e+f x])^m (c+d\,\mathrm{Sin}[e+f x])^n (A+B\,\mathrm{Sin}[e+f x])\, dx \longrightarrow$$
$$-\frac{b B\,\mathrm{Cos}[e+f x]\,(a+b\,\mathrm{Sin}[e+f x])^{m-1} (c+d\,\mathrm{Sin}[e+f x])^{n+1}}{d f (m+n+1)} +$$
$$\frac{1}{d (m+n+1)} \int (a+b\,\mathrm{Sin}[e+f x])^{m-1} (c+d\,\mathrm{Sin}[e+f x])^n \cdot$$
$$\left(a A d (m+n+1) + B \left(a c (m-1) + b d (n+1)\right) + \left(A b d (m+n+1) - B \left(b c m - a d (2 m+n)\right)\right) \mathrm{Sin}[e+f x]\right) dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -b*B*Cos[e+f*x]*(a+b*Sin[e+f*x])^(m-1)*(c+d*Sin[e+f*x])^(n+1)/(d*f*(m+n+1)) +
  1/(d*(m+n+1))*Int[(a+b*Sin[e+f*x])^(m-1)*(c+d*Sin[e+f*x])^n*
    Simp[a*A*d*(m+n+1)+B*(a*c*(m-1)+b*d*(n+1))+(A*b*d*(m+n+1)-B*(b*c*m-a*d*(2*m+n)))*Sin[e+f*x],x],x] /;
FreeQ[{a,b,c,d,e,f,A,B,n},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && GtQ[m,1/2] && Not[LtQ[n,-1]] && IntegerQ[2*m] &
  (IntegerQ[2*n] || EqQ[c,0])
```

3. $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2=0\,\wedge\,c^2-d^2\neq 0\,\wedge\,m<-\frac{1}{2}$

1: $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2=0\,\wedge\,c^2-d^2\neq 0\,\wedge\,m<-\frac{1}{2}\,\wedge\,n>0$

Derivation: Singly degenerate sine recurrence 2a with p → 0

Rule: If $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2=0\,\wedge\,c^2-d^2\neq 0\,\wedge\,m<-\frac{1}{2}\,\wedge\,n>0$, then

$$\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx\,\longrightarrow$$
$$\frac{(A\,b-a\,B)\,\mathrm{Cos}[e+f\,x]\,(a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n}{a\,f\,(2\,m+1)}-$$
$$\frac{1}{a\,b\,(2\,m+1)}\int (a+b\,\mathrm{Sin}[e+f\,x])^{m+1}\,(c+d\,\mathrm{Sin}[e+f\,x])^{n-1}\,\cdot$$
$$(A\,(a\,d\,n-b\,c\,(m+1))-B\,(a\,c\,m+b\,d\,n)-d\,(a\,B\,(m-n)+A\,b\,(m+n+1))\,\mathrm{Sin}[e+f\,x])\,dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  (A*b-a*B)*Cos[e+f*x]*(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^n/(a*f*(2*m+1)) -
  1/(a*b*(2*m+1))*Int[(a+b*Sin[e+f*x])^(m+1)*(c+d*Sin[e+f*x])^(n-1)*
    Simp[A*(a*d*n-b*c*(m+1))-B*(a*c*m+b*d*n)-d*(a*B*(m-n)+A*b*(m+n+1))*Sin[e+f*x],x],x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && LtQ[m,-1/2] && GtQ[n,0] && IntegerQ[2*m] &&
  (IntegerQ[2*n] || EqQ[c,0])
```

2: $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2=0\,\wedge\,c^2-d^2\neq 0\,\wedge\,m<-\frac{1}{2}\,\wedge\,n\not>0$

Derivation: Singly degenerate sine recurrence 2b with p → 0

Rule: If $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2=0\,\wedge\,c^2-d^2\neq 0\,\wedge\,m<-\frac{1}{2}\,\wedge\,n\not>0$, then

$$\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx\,\longrightarrow$$

$$\frac{b\,(A\,b-a\,B)\,\mathrm{Cos}[e+f\,x]\,(a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^{n+1}}{a\,f\,(2\,m+1)\,(b\,c-a\,d)}+$$
$$\frac{1}{a\,(2\,m+1)\,(b\,c-a\,d)}\int(a+b\,\mathrm{Sin}[e+f\,x])^{m+1}\,(c+d\,\mathrm{Sin}[e+f\,x])^n\cdot$$
$$(B\,(a\,c\,m+b\,d\,(n+1))+A\,(b\,c\,(m+1)-a\,d\,(2\,m+n+2))+d\,(A\,b-a\,B)\,(m+n+2)\,\mathrm{Sin}[e+f\,x])\,dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  b*(A*b-a*B)*Cos[e+f*x]*(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^(n+1)/(a*f*(2*m+1)*(b*c-a*d)) +
  1/(a*(2*m+1)*(b*c-a*d))*Int[(a+b*Sin[e+f*x])^(m+1)*(c+d*Sin[e+f*x])^n*
    Simp[B*(a*c*m+b*d*(n+1))+A*(b*c*(m+1)-a*d*(2*m+n+2))+d*(A*b-a*B)*(m+n+2)*Sin[e+f*x],x],x] /;
FreeQ[{a,b,c,d,e,f,A,B,n},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && LtQ[m,-1/2] && Not[GtQ[n,0]] && IntegerQ[2*m] &
  (IntegerQ[2*n] || EqQ[c,0])
```

4. $\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0$

1:

$\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0\,\land\,A\,b\,d\,(2\,n+3)-B\,(b\,c-2\,a\,d\,(n+1))==0$

Derivation: Singly degenerate sine recurrence 1a with $B\to -\frac{A\,b\,(3+2\,n)}{2\,a\,(1+n)}$, $m\to\frac{1}{2}$, $p\to 0$

Derivation: Singly degenerate sine recurrence 1b with $B\to -\frac{A\,b\,(3+2\,n)}{2\,a\,(1+n)}$, $m\to\frac{1}{2}$, $p\to 0$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0\,\land\,A\,b\,d\,(2\,n+3)-B\,(b\,c-2\,a\,d\,(n+1))==0$, then

$$\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx\,\longrightarrow\,-\frac{2\,b\,B\,\text{Cos}[e+f\,x]\,(c+d\,\text{Sin}[e+f\,x])^{n+1}}{d\,f\,(2\,n+3)\,\sqrt{a+b\,\text{Sin}[e+f\,x]}}$$

Program code:

```
Int[Sqrt[a_+b_.*sin[e_.+f_.*x_]]*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -2*b*B*Cos[e+f*x]*(c+d*Sin[e+f*x])^(n+1)/(d*f*(2*n+3)*Sqrt[a+b*Sin[e+f*x]]) /;
FreeQ[{a,b,c,d,e,f,A,B,n},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && EqQ[A*b*d*(2*n+3)-B*(b*c-2*a*d*(n+1)),0]
```

2: $\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0\,\land\,n<-1$

Derivation: Singly degenerate sine recurrence 1a with $m\to\frac{1}{2}$, $p\to 0$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0\,\land\,n<-1$, then

$$\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx\,\longrightarrow$$

$$-\frac{b^2\,(B\,c-A\,d)\,\text{Cos}[e+f\,x]\,(c+d\,\text{Sin}[e+f\,x])^{n+1}}{d\,f\,(n+1)\,(b\,c+a\,d)\,\sqrt{a+b\,\text{Sin}[e+f\,x]}}\,+$$

$$\frac{A\,b\,d\,(2\,n+3)-B\,(b\,c-2\,a\,d\,(n+1))}{2\,d\,(n+1)\,(b\,c+a\,d)}\int\sqrt{a+b\,\text{Sin}[e+f\,x]}\;(c+d\,\text{Sin}[e+f\,x])^{n+1}\,dx$$

Program code:

```
Int[Sqrt[a_+b_.*sin[e_.+f_.*x_]]*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -b^2*(B*c-A*d)*Cos[e+f*x]*(c+d*Sin[e+f*x])^(n+1)/(d*f*(n+1)*(b*c+a*d)*Sqrt[a+b*Sin[e+f*x]]) +
  (A*b*d*(2*n+3)-B*(b*c-2*a*d*(n+1)))/(2*d*(n+1)*(b*c+a*d))*Int[Sqrt[a+b*Sin[e+f*x]]*(c+d*Sin[e+f*x])^(n+1),x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && LtQ[n,-1]
```

3: $\int\sqrt{a+b\,\text{Sin}[e+f\,x]}\;(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0\,\land\,n\nless -1$

Derivation: Singly degenerate sine recurrence 1b with $m\to\frac{1}{2}$, $p\to 0$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0\,\land\,n\nless -1$, then

$$\int\sqrt{a+b\,\text{Sin}[e+f\,x]}\;(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])\,dx\;\longrightarrow$$

$$-\frac{2\,b\,B\,\text{Cos}[e+f\,x]\,(c+d\,\text{Sin}[e+f\,x])^{n+1}}{d\,f\,(2\,n+3)\,\sqrt{a+b\,\text{Sin}[e+f\,x]}}+$$

$$\frac{A\,b\,d\,(2\,n+3)-B\,(b\,c-2\,a\,d\,(n+1))}{b\,d\,(2\,n+3)}\int\sqrt{a+b\,\text{Sin}[e+f\,x]}\;(c+d\,\text{Sin}[e+f\,x])^n\,dx$$

Program code:

```
Int[Sqrt[a_+b_.*sin[e_.+f_.*x_]]*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -2*b*B*Cos[e+f*x]*(c+d*Sin[e+f*x])^(n+1)/(d*f*(2*n+3)*Sqrt[a+b*Sin[e+f*x]]) +
  (A*b*d*(2*n+3)-B*(b*c-2*a*d*(n+1)))/(b*d*(2*n+3))*Int[Sqrt[a+b*Sin[e+f*x]]*(c+d*Sin[e+f*x])^n,x] /;
FreeQ[{a,b,c,d,e,f,A,B,n},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && Not[LtQ[n,-1]]
```

5: $\int \frac{A+B\,\mathrm{Sin}[e+f\,x]}{\sqrt{a+b\,\mathrm{Sin}[e+f\,x]}\,\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0$

Derivation: Algebraic expansion

Baisi: $A+B\,z==\frac{A\,b-a\,B}{b}+\frac{B\,(a+b\,z)}{b}$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0$, then

$$\int \frac{A+B\,\mathrm{Sin}[e+f\,x]}{\sqrt{a+b\,\mathrm{Sin}[e+f\,x]}\,\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx\to\frac{A\,b-a\,B}{b}\int \frac{1}{\sqrt{a+b\,\mathrm{Sin}[e+f\,x]}\,\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx+\frac{B}{b}\int \frac{\sqrt{a+b\,\mathrm{Sin}[e+f\,x]}}{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx$$

Program code:

```
Int[(A_.+B_.*sin[e_.+f_.*x_])/(Sqrt[a_+b_.*sin[e_.+f_.*x_]]*Sqrt[c_.+d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  (A*b-a*B)/b*Int[1/(Sqrt[a+b*Sin[e+f*x]]*Sqrt[c+d*Sin[e+f*x]]),x] +
  B/b*Int[Sqrt[a+b*Sin[e+f*x]]/Sqrt[c+d*Sin[e+f*x]],x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0]
```

6: $\int (a + b \,\text{Sin}[e + f x])^m (c + d \,\text{Sin}[e + f x])^n (A + B \,\text{Sin}[e + f x]) \,dx$ when $b c - a d \neq 0 \land a^2 - b^2 == 0 \land c^2 - d^2 \neq 0 \land n > 0$

Derivation: Singly degenerate sine recurrence 2c with $p \to 0$

Rule: If $b c - a d \neq 0 \land a^2 - b^2 == 0 \land c^2 - d^2 \neq 0 \land n > 0$, then

$$\int (a + b \,\text{Sin}[e + f x])^m (c + d \,\text{Sin}[e + f x])^n (A + B \,\text{Sin}[e + f x]) \,dx \longrightarrow$$
$$-\frac{B \,\text{Cos}[e + f x] (a + b \,\text{Sin}[e + f x])^m (c + d \,\text{Sin}[e + f x])^n}{f (m + n + 1)} +$$
$$\frac{1}{b (m + n + 1)} \int (a + b \,\text{Sin}[e + f x])^m (c + d \,\text{Sin}[e + f x])^{n-1} (A b c (m + n + 1) + B (a c m + b d n) + (A b d (m + n + 1) + B (a d m + b c n)) \,\text{Sin}[e + f x]) \,dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -B*Cos[e+f*x]*(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^n/(f*(m+n+1)) +
  1/(b*(m+n+1))*Int[(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^(n-1)*
    Simp[A*b*c*(m+n+1)+B*(a*c*m+b*d*n)+(A*b*d*(m+n+1)+B*(a*d*m+b*c*n))*Sin[e+f*x],x],x] /;
FreeQ[{a,b,c,d,e,f,A,B,m},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && GtQ[n,0] && (IntegerQ[n] || EqQ[m+1/2,0])
```

7: $\int (a + b \,\text{Sin}[e + f x])^m (c + d \,\text{Sin}[e + f x])^n (A + B \,\text{Sin}[e + f x]) \,dx$ when $b c - a d \neq 0 \land a^2 - b^2 == 0 \land c^2 - d^2 \neq 0 \land n < -1$

Derivation: Singly degenerate sine recurrence 1c with $p \to 0$

Rule: If $b c - a d \neq 0 \land a^2 - b^2 == 0 \land c^2 - d^2 \neq 0 \land n < -1$, then

$$\int (a + b \,\text{Sin}[e + f x])^m (c + d \,\text{Sin}[e + f x])^n (A + B \,\text{Sin}[e + f x]) \,dx \longrightarrow$$
$$\frac{(B c - A d) \,\text{Cos}[e + f x] (a + b \,\text{Sin}[e + f x])^m (c + d \,\text{Sin}[e + f x])^{n+1}}{f (n + 1) (c^2 - d^2)} +$$

$$\frac{1}{b\,(n+1)\,\left(c^2-d^2\right)}\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^{n+1}\,\left(A\,\left(a\,d\,m+b\,c\,(n+1)\right)-B\,\left(a\,c\,m+b\,d\,(n+1)\right)+b\,\left(B\,c-A\,d\right)\,(m+n+2)\,\text{Sin}[e+f\,x]\right)\,dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  (B*c-A*d)*Cos[e+f*x]*(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^(n+1)/(f*(n+1)*(c^2-d^2)) +
  1/(b*(n+1)*(c^2-d^2))*Int[(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^(n+1)*
    Simp[A*(a*d*m+b*c*(n+1))-B*(a*c*m+b*d*(n+1))+b*(B*c-A*d)*(m+n+2)*Sin[e+f*x],x],x] /;
FreeQ[{a,b,c,d,e,f,A,B,m},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && LtQ[n,-1] && (IntegerQ[n] || EqQ[m+1/2,0])
```

8. $\int\frac{(a+b\,\text{Sin}[e+f\,x])^m\,(A+B\,\text{Sin}[e+f\,x])}{c+d\,\text{Sin}[e+f\,x]}\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2==0\,\wedge\,c^2-d^2\neq 0$

1: $\int\frac{A+B\,\text{Sin}[e+f\,x]}{\sqrt{a+b\,\text{Sin}[e+f\,x]}\,(c+d\,\text{Sin}[e+f\,x])}\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2==0\,\wedge\,c^2-d^2\neq 0$

Derivation: Algebraic expansion

Basis: $\frac{A+B\,z}{\sqrt{a+b\,z}\,(c+d\,z)}==\frac{A\,b-a\,B}{(b\,c-a\,d)\,\sqrt{a+b\,z}}+\frac{(B\,c-A\,d)\,\sqrt{a+b\,z}}{(b\,c-a\,d)\,(c+d\,z)}$

Rule: If $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2==0\,\wedge\,c^2-d^2\neq 0$, then

$$\int\frac{A+B\,\text{Sin}[e+f\,x]}{\sqrt{a+b\,\text{Sin}[e+f\,x]}\,(c+d\,\text{Sin}[e+f\,x])}\,dx\,\longrightarrow\,\frac{A\,b-a\,B}{b\,c-a\,d}\int\frac{1}{\sqrt{a+b\,\text{Sin}[e+f\,x]}}\,dx+\frac{B\,c-A\,d}{b\,c-a\,d}\int\frac{\sqrt{a+b\,\text{Sin}[e+f\,x]}}{c+d\,\text{Sin}[e+f\,x]}\,dx$$

Program code:

```
Int[(A_.+B_.*sin[e_.+f_.*x_])/(Sqrt[a_+b_.*sin[e_.+f_.*x_]]*(c_.+d_.*sin[e_.+f_.*x_])),x_Symbol] :=
  (A*b-a*B)/(b*c-a*d)*Int[1/Sqrt[a+b*Sin[e+f*x]],x] +
  (B*c-A*d)/(b*c-a*d)*Int[Sqrt[a+b*Sin[e+f*x]]/(c+d*Sin[e+f*x]),x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0]
```

2: $\int \frac{(a+b\,\text{Sin}[e+f\,x])^m\,(A+B\,\text{Sin}[e+f\,x])}{c+d\,\text{Sin}[e+f\,x]}\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0\,\land\,m\neq -\frac{1}{2}$

Derivation: Algebraic expansion

Baisi: $\frac{A+B\,z}{c+d\,z}==\frac{B}{d}-\frac{B\,c-A\,d}{d\,(c+d\,z)}$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2==0\,\land\,c^2-d^2\neq 0\,\land\,m\neq -\frac{1}{2}$, then

$$\int \frac{(a+b\,\text{Sin}[e+f\,x])^m\,(A+B\,\text{Sin}[e+f\,x])}{c+d\,\text{Sin}[e+f\,x]}\,dx\,\rightarrow\,\frac{B}{d}\int (a+b\,\text{Sin}[e+f\,x])^m\,dx-\frac{B\,c-A\,d}{d}\int \frac{(a+b\,\text{Sin}[e+f\,x])^m}{c+d\,\text{Sin}[e+f\,x]}\,dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(A_.+B_.*sin[e_.+f_.*x_])/(c_.+d_.*sin[e_.+f_.*x_]),x_Symbol] :=
  B/d*Int[(a+b*Sin[e+f*x])^m,x] - (B*c-A*d)/d*Int[(a+b*Sin[e+f*x])^m/(c+d*Sin[e+f*x]),x] /;
FreeQ[{a,b,c,d,e,f,A,B,m},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && NeQ[m+1/2,0]
```

9: $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2=0\,\land\,c^2-d^2\neq 0$

Derivation: Algebraic expansion

Baisi: $A+B\,z=\frac{A\,b-a\,B}{b}+\frac{B\,(a+b\,z)}{b}$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2=0\,\land\,c^2-d^2\neq 0$, then

$$\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx\,\to$$
$$\frac{A\,b-a\,B}{b}\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,dx+\frac{B}{b}\int (a+b\,\mathrm{Sin}[e+f\,x])^{m+1}\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,dx$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_.*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  (A*b-a*B)/b*Int[(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^n,x] +
  B/b*Int[(a+b*Sin[e+f*x])^(m+1)*(c+d*Sin[e+f*x])^n,x] /;
FreeQ[{a,b,c,d,e,f,A,B,m,n},x] && NeQ[b*c-a*d,0] && EqQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && NeQ[A*b+a*B,0]
```

6. $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0$

1. $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0\,\land\,m>1$

1: $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0\,\land\,m>1\,\land\,n<-1$

Derivation: Nondegenerate sine recurrence 1a with $A\to a\,A,\;B\to A\,b+a\,B,\;C\to b\,B,\;m\to m-1,\;p\to 0$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0\,\land\,m>1\,\land\,n<-1$, then

$$\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx\,\to$$
$$-(((b\,c-a\,d)\,(B\,c-A\,d)\,\mathrm{Cos}[e+f\,x]\,(a+b\,\mathrm{Sin}[e+f\,x])^{m-1}\,(c+d\,\mathrm{Sin}[e+f\,x])^{n+1})\,/\,(d\,f\,(n+1)\,(c^2-d^2)))\,+$$

$$\frac{1}{d\,(n+1)\,(c^2-d^2)}\int (a+b\,\mathrm{Sin}[e+f\,x])^{m-2}\,(c+d\,\mathrm{Sin}[e+f\,x])^{n+1}\cdot$$
$$\big(b\,(b\,c-a\,d)\,(B\,c-A\,d)\,(m-1)+a\,d\,(a\,A\,c+b\,B\,c-(A\,b+a\,B)\,d)\,(n+1)+$$
$$\left(b\,\left(b\,d\,(B\,c-A\,d)+a\,\left(A\,c\,d+B\,(c^2-2\,d^2)\right)\right)\,(n+1)-a\,(b\,c-a\,d)\,(B\,c-A\,d)\,(n+2)\right)\,\mathrm{Sin}[e+f\,x]+$$
$$b\,\left(d\,(A\,b\,c+a\,B\,c-a\,A\,d)\,(m+n+1)-b\,B\,\left(c^2\,m+d^2\,(n+1)\right)\right)\,\mathrm{Sin}[e+f\,x]^2\big)\,dx$$

Program code:

```
Int[(a_.+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -(b*c-a*d)*(B*c-A*d)*Cos[e+f*x]*(a+b*Sin[e+f*x])^(m-1)*(c+d*Sin[e+f*x])^(n+1)/(d*f*(n+1)*(c^2-d^2)) +
  1/(d*(n+1)*(c^2-d^2))*Int[(a+b*Sin[e+f*x])^(m-2)*(c+d*Sin[e+f*x])^(n+1)*
    Simp[b*(b*c-a*d)*(B*c-A*d)*(m-1)+a*d*(a*A*c+b*B*c-(A*b+a*B)*d)*(n+1)+
      (b*(b*d*(B*c-A*d)+a*(A*c*d+B*(c^2-2*d^2)))*(n+1)-a*(b*c-a*d)*(B*c-A*d)*(n+2))*Sin[e+f*x]+
      b*(d*(A*b*c+a*B*c-a*A*d)*(m+n+1)-b*B*(c^2*m+d^2*(n+1)))*Sin[e+f*x]^2,x],x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && GtQ[m,1] && LtQ[n,-1]
```

2: $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\land a^2-b^2\neq 0\land c^2-d^2\neq 0\land m>1\land n\nless -1$

Derivation: Nondegenerate sine recurrence 1b with $A\to a\,A,\ B\to A\,b+a\,B,\ C\to b\,B,\ m\to m-1,\ p\to 0$

Rule: If $b\,c-a\,d\neq 0\land a^2-b^2\neq 0\land c^2-d^2\neq 0\land m>1\land n\nless -1$, then

$$\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx\longrightarrow$$
$$-\frac{b\,B\,\mathrm{Cos}[e+f\,x]\,(a+b\,\mathrm{Sin}[e+f\,x])^{m-1}\,(c+d\,\mathrm{Sin}[e+f\,x])^{n+1}}{d\,f\,(m+n+1)}+$$
$$\frac{1}{d\,(m+n+1)}\int (a+b\,\mathrm{Sin}[e+f\,x])^{m-2}\,(c+d\,\mathrm{Sin}[e+f\,x])^n\cdot$$
$$\big(a^2\,A\,d\,(m+n+1)+b\,B\,(b\,c\,(m-1)+a\,d\,(n+1))+$$
$$(a\,d\,(2\,A\,b+a\,B)\,(m+n+1)-b\,B\,(a\,c-b\,d\,(m+n)))\,\mathrm{Sin}[e+f\,x]+$$
$$b\,(A\,b\,d\,(m+n+1)-B\,(b\,c\,m-a\,d\,(2\,m+n)))\,\mathrm{Sin}[e+f\,x]^2\big)\,dx$$

Program code:

```
Int[(a_.+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -b*B*Cos[e+f*x]*(a+b*Sin[e+f*x])^(m-1)*(c+d*Sin[e+f*x])^(n+1)/(d*f*(m+n+1)) +
  1/(d*(m+n+1))*Int[(a+b*Sin[e+f*x])^(m-2)*(c+d*Sin[e+f*x])^n*
     Simp[a^2*A*d*(m+n+1)+b*B*(b*c*(m-1)+a*d*(n+1))+
       (a*d*(2*A*b+a*B)*(m+n+1)-b*B*(a*c-b*d*(m+n)))*Sin[e+f*x]+
       b*(A*b*d*(m+n+1)-B*(b*c*m-a*d*(2*m+n)))*Sin[e+f*x]^2,x],x] /;
FreeQ[{a,b,c,d,e,f,A,B,n},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && GtQ[m,1] && Not[IGtQ[n,1] &&
  (Not[IntegerQ[m]] || EqQ[a,0] && NeQ[c,0])]
```

2. $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\land a^2-b^2\neq 0\land c^2-d^2\neq 0\land m<-1$

1. $\int \frac{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}\,(A+B\,\mathrm{Sin}[e+f\,x])}{(a+b\,\mathrm{Sin}[e+f\,x])^{3/2}}\,dx$ when $b\,c-a\,d\neq 0\land a^2-b^2\neq 0\land c^2-d^2\neq 0$

1: $\int \frac{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}\,\left(A+B\,\mathrm{Sin}[e+f\,x]\right)}{\left(b\,\mathrm{Sin}[e+f\,x]\right)^{3/2}}\,dx$ when $c^2-d^2\neq 0$

Derivation: Algebraic expansion

Basis: $\frac{(A+B\,z)\,\sqrt{c+d\,z}}{(b\,z)^{3/2}} == \frac{B\,d\,\sqrt{b\,z}}{b^2\,\sqrt{c+d\,z}} + \frac{A\,c+(B\,c+A\,d)\,z}{(b\,z)^{3/2}\,\sqrt{c+d\,z}}$

Rule: If $b\,c-a\,d\neq 0\,\land\,c^2-d^2\neq 0$, then

$$\int \frac{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}\,\left(A+B\,\mathrm{Sin}[e+f\,x]\right)}{\left(b\,\mathrm{Sin}[e+f\,x]\right)^{3/2}}\,dx \to \frac{B\,d}{b^2}\int \frac{\sqrt{b\,\mathrm{Sin}[e+f\,x]}}{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx + \int \frac{A\,c+\left(B\,c+A\,d\right)\,\mathrm{Sin}[e+f\,x]}{\left(b\,\mathrm{Sin}[e+f\,x]\right)^{3/2}\,\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx$$

Program code:

```
Int[Sqrt[c_+d_.*sin[e_.+f_.*x_]]*(A_.+B_.*sin[e_.+f_.*x_])/(b_.*sin[e_.+f_.*x_])^(3/2),x_Symbol] :=
  B*d/b^2*Int[Sqrt[b*Sin[e+f*x]]/Sqrt[c+d*Sin[e+f*x]],x] +
  Int[(A*c+(B*c+A*d)*Sin[e+f*x])/((b*Sin[e+f*x])^(3/2)*Sqrt[c+d*Sin[e+f*x]]),x] /;
FreeQ[{b,c,d,e,f,A,B},x] && NeQ[c^2-d^2,0]
```

2: $\int \frac{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}\,(A+B\,\mathrm{Sin}[e+f\,x])}{(a+b\,\mathrm{Sin}[e+f\,x])^{3/2}}\,dx$ when $b\,c-a\,d\neq 0\land a^2-b^2\neq 0\land c^2-d^2\neq 0$

Derivation: Algebraic expansion

Basis: $\frac{A+B\,z}{a+b\,z}==\frac{B}{b}+\frac{A\,b-a\,B}{b\,(a+b\,z)}$

Rule: If $b\,c-a\,d\neq 0\land a^2-b^2\neq 0\land c^2-d^2\neq 0$, then

$$\int \frac{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}\,(A+B\,\mathrm{Sin}[e+f\,x])}{(a+b\,\mathrm{Sin}[e+f\,x])^{3/2}}\,dx\to\frac{B}{b}\int \frac{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}{\sqrt{a+b\,\mathrm{Sin}[e+f\,x]}}\,dx+\frac{A\,b-a\,B}{b}\int \frac{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}{(a+b\,\mathrm{Sin}[e+f\,x])^{3/2}}\,dx$$

Program code:

```
Int[Sqrt[c_.+d_.*sin[e_.+f_.*x_]]*(A_.+B_.*sin[e_.+f_.*x_])/(a_+b_.*sin[e_.+f_.*x_])^(3/2),x_Symbol] :=
  B/b*Int[Sqrt[c+d*Sin[e+f*x]]/Sqrt[a+b*Sin[e+f*x]],x] +
  (A*b-a*B)/b*Int[Sqrt[c+d*Sin[e+f*x]]/(a+b*Sin[e+f*x])^(3/2),x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0]
```

2. $\int \frac{A+B\,\mathrm{Sin}[e+f\,x]}{(a+b\,\mathrm{Sin}[e+f\,x])^{3/2}\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx$ when $b\,c-a\,d\neq 0\land a^2-b^2\neq 0\land c^2-d^2\neq 0$

1: $\int \frac{A+B\,\mathrm{Sin}[e+f\,x]}{(a+b\,\mathrm{Sin}[e+f\,x])^{3/2}\sqrt{d\,\mathrm{Sin}[e+f\,x]}}\,dx$ when $a^2-b^2\neq 0$

Derivation: Nondegenerate sine recurrence 1a with $c\to 0$, $C\to 0$, $m\to -\frac{3}{2}$, $n\to -\frac{1}{2}$, $p\to 0$

Rule: If $a^2-b^2\neq 0$, then

$$\int \frac{A + B \operatorname{Sin}[e + f x]}{(a + b \operatorname{Sin}[e + f x])^{3/2} \sqrt{d \operatorname{Sin}[e + f x]}} \, dx \longrightarrow \frac{2 (A b - a B) \operatorname{Cos}[e + f x]}{f (a^2 - b^2) \sqrt{a + b \operatorname{Sin}[e + f x]} \sqrt{d \operatorname{Sin}[e + f x]}} + \frac{d}{(a^2 - b^2)} \int \frac{A b - a B + (a A - b B) \operatorname{Sin}[e + f x]}{\sqrt{a + b \operatorname{Sin}[e + f x]} (d \operatorname{Sin}[e + f x])^{3/2}} \, dx$$

Program code:

```
Int[(A_.+B_.*sin[e_.+f_.*x_])/((a_+b_.*sin[e_.+f_.*x_])^(3/2)*Sqrt[d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  2*(A*b-a*B)*Cos[e+f*x]/(f*(a^2-b^2)*Sqrt[a+b*Sin[e+f*x]]*Sqrt[d*Sin[e+f*x]]) +
  d/(a^2-b^2)*Int[(A*b-a*B+(a*A-b*B)*Sin[e+f*x])/(Sqrt[a+b*Sin[e+f*x]]*(d*Sin[e+f*x])^(3/2)),x] /;
FreeQ[{a,b,d,e,f,A,B},x] && NeQ[a^2-b^2,0]
```

2. $\int \frac{A + B \sin[e + f x]}{(a + b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} \, dx$ when $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0$

1. $\int \frac{A + B \sin[e + f x]}{(a + b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} \, dx$ when $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0 \land A == B$

1. $\int \frac{A + B \sin[e + f x]}{(b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} \, dx$ when $c^2 - d^2 \neq 0 \land A == B$

1: $\int \frac{A + B \sin[e + f x]}{(b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} \, dx$ when $c^2 - d^2 \neq 0 \land A == B \land \frac{c+d}{b} > 0$

Rule: If $c^2 - d^2 \neq 0 \land A == B \land \frac{c+d}{b} > 0$, then

$$\int \frac{A + B \sin[e + f x]}{(b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} \, dx \to$$

$$-\frac{2 A (c - d) \tan[e + f x]}{f b c^2} \sqrt{\frac{c + d}{b}} \sqrt{\frac{c (1 + \csc[e + f x])}{c - d}} \sqrt{\frac{c (1 - \csc[e + f x])}{c + d}} \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{c + d \sin[e + f x]}}{\sqrt{b \sin[e + f x]}} \Big/ \sqrt{\frac{c + d}{b}}\right], -\frac{c + d}{c - d}\right]$$

Program code:

```
Int[(A_+B_.*sin[e_.+f_.*x_])/((b_.*sin[e_.+f_.*x_])^(3/2)*Sqrt[c_+d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  -2*A*(c-d)*Tan[e+f*x]/(f*b*c^2)*Rt[(c+d)/b,2]*Sqrt[c*(1+Csc[e+f*x])/(c-d)]*Sqrt[c*(1-Csc[e+f*x])/(c+d)]*
    EllipticE[ArcSin[Sqrt[c+d*Sin[e+f*x]]/Sqrt[b*Sin[e+f*x]]/Rt[(c+d)/b,2]],-(c+d)/(c-d)] /;
FreeQ[{b,c,d,e,f,A,B},x] && NeQ[c^2-d^2,0] && EqQ[A,B] && PosQ[(c+d)/b]
```

2: $\int \frac{A + B \sin[e + f x]}{(b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} dx$ when $c^2 - d^2 \neq 0 \land A == B \land \frac{c+d}{b} \ngtr 0$

Derivation: Piecewise constant extraction

Basis: $\partial_x \frac{\sqrt{-F[x]}}{\sqrt{F[x]}} == 0$

Rule: If $c^2 - d^2 \neq 0 \land A == B \land \frac{c+d}{b} \ngtr 0$, then

$$\int \frac{A + B \sin[e + f x]}{(b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} dx \to -\frac{\sqrt{-b \sin[e + f x]}}{\sqrt{b \sin[e + f x]}} \int \frac{A + B \sin[e + f x]}{(-b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} dx$$

Program code:

```
Int[(A_+B_.*sin[e_.+f_.*x_])/((b_.*sin[e_.+f_.*x_])^(3/2)*Sqrt[c_+d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  -Sqrt[-b*Sin[e+f*x]]/Sqrt[b*Sin[e+f*x]]*Int[(A+B*Sin[e+f*x])/((-b*Sin[e+f*x])^(3/2)*Sqrt[c+d*Sin[e+f*x]]),x] /;
FreeQ[{b,c,d,e,f,A,B},x] && NeQ[c^2-d^2,0] && EqQ[A,B] && NegQ[(c+d)/b]
```

2. $\int \frac{A + B \sin[e + f x]}{(a + b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} dx$ when $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0 \land A == B$

1: $\int \frac{A + B \sin[e + f x]}{(a + b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} dx$ when $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0 \land A == B \land \frac{a+b}{c+d} > 0$

Rule: If $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0 \land A == B \land \frac{a+b}{c+d} > 0$, then

$$\int \frac{A + B \sin[e + f x]}{(a + b \sin[e + f x])^{3/2} \sqrt{c + d \sin[e + f x]}} dx \to$$

$$-\frac{2\,A\,(c-d)\,(a+b\,\mathrm{Sin}[e+f\,x])}{f\,(b\,c-a\,d)^2\,\sqrt{\frac{a+b}{c+d}}\,\mathrm{Cos}[e+f\,x]}\sqrt{\frac{(b\,c-a\,d)\,(1+\mathrm{Sin}[e+f\,x])}{(c-d)\,(a+b\,\mathrm{Sin}[e+f\,x])}}$$

$$\sqrt{-\frac{(b\,c-a\,d)\,(1-\mathrm{Sin}[e+f\,x])}{(c+d)\,(a+b\,\mathrm{Sin}[e+f\,x])}}\;\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\sqrt{\frac{a+b}{c+d}}\,\frac{\sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}{\sqrt{a+b\,\mathrm{Sin}[e+f\,x]}}\right],\frac{(a-b)\,(c+d)}{(a+b)\,(c-d)}\right]$$

Program code:

```
Int[(A_+B_.*sin[e_.+f_.*x_])/((a_+b_.*sin[e_.+f_.*x_])^(3/2)*Sqrt[c_+d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  -2*A*(c-d)*(a+b*Sin[e+f*x])/(f*(b*c-a*d)^2*Rt[(a+b)/(c+d),2]*Cos[e+f*x])*
    Sqrt[(b*c-a*d)*(1+Sin[e+f*x])/((c-d)*(a+b*Sin[e+f*x]))]*
    Sqrt[-(b*c-a*d)*(1-Sin[e+f*x])/((c+d)*(a+b*Sin[e+f*x]))]*
    EllipticE[ArcSin[Rt[(a+b)/(c+d),2]*Sqrt[c+d*Sin[e+f*x]]/Sqrt[a+b*Sin[e+f*x]]],(a-b)*(c+d)/((a+b)*(c-d))] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && EqQ[A,B] && PosQ[(a+b)/(c+d)]
```

2: $\int \frac{A+B\,\text{Sin}[e+f\,x]}{(a+b\,\text{Sin}[e+f\,x])^{3/2}\sqrt{c+d\,\text{Sin}[e+f\,x]}}\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0\,\wedge\,A==B\,\wedge\,\frac{a+b}{c+d}\ngtr 0$

Derivation: Piecewise constant extraction

Basis: $\partial_x \frac{\sqrt{-F[x]}}{\sqrt{F[x]}}==0$

Rule: If $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0\,\wedge\,A==B\,\wedge\,\frac{a+b}{c+d}\ngtr 0$, then

$$\int \frac{A+B\,\text{Sin}[e+f\,x]}{(a+b\,\text{Sin}[e+f\,x])^{3/2}\sqrt{c+d\,\text{Sin}[e+f\,x]}}\,dx \rightarrow \frac{\sqrt{-c-d\,\text{Sin}[e+f\,x]}}{\sqrt{c+d\,\text{Sin}[e+f\,x]}}\int \frac{A+B\,\text{Sin}[e+f\,x]}{(a+b\,\text{Sin}[e+f\,x])^{3/2}\sqrt{-c-d\,\text{Sin}[e+f\,x]}}\,dx$$

Program code:

```
Int[(A_+B_.*sin[e_.+f_.*x_])/((a_+b_.*sin[e_.+f_.*x_])^(3/2)*Sqrt[c_+d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  Sqrt[-c-d*Sin[e+f*x]]/Sqrt[c+d*Sin[e+f*x]]*Int[(A+B*Sin[e+f*x])/((a+b*Sin[e+f*x])^(3/2)*Sqrt[-c-d*Sin[e+f*x]]),x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && EqQ[A,B] && NegQ[(a+b)/(c+d)]
```

2: $\int \frac{A+B\,\text{Sin}[e+f\,x]}{(a+b\,\text{Sin}[e+f\,x])^{3/2}\sqrt{c+d\,\text{Sin}[e+f\,x]}}\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0\,\wedge\,A\neq B$

Derivation: Algebraic expansion

Basis: $\frac{A+B\,z}{(a+b\,z)^{3/2}}==\frac{A-B}{(a-b)\sqrt{a+b\,z}}-\frac{(A\,b-a\,B)\,(1+z)}{(a-b)\,(a+b\,z)^{3/2}}$

Rule: If $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0\,\wedge\,A\neq B$, then

$$\int \frac{A+B\,\text{Sin}[e+f\,x]}{(a+b\,\text{Sin}[e+f\,x])^{3/2}\sqrt{c+d\,\text{Sin}[e+f\,x]}}\,dx \rightarrow$$

$$\frac{A-B}{a-b}\int \frac{1}{\sqrt{a+b\,\mathrm{Sin}[e+f\,x]}\ \sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx-\frac{A\,b-a\,B}{a-b}\int \frac{1+\mathrm{Sin}[e+f\,x]}{(a+b\,\mathrm{Sin}[e+f\,x])^{3/2}\ \sqrt{c+d\,\mathrm{Sin}[e+f\,x]}}\,dx$$

Program code:

```
Int[(A_.+B_.*sin[e_.+f_.*x_])/((a_.+b_.*sin[e_.+f_.*x_])^(3/2)*Sqrt[c_+d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  (A-B)/(a-b)*Int[1/(Sqrt[a+b*Sin[e+f*x]]*Sqrt[c+d*Sin[e+f*x]]),x] -
  (A*b-a*B)/(a-b)*Int[(1+Sin[e+f*x])/((a+b*Sin[e+f*x])^(3/2)*Sqrt[c+d*Sin[e+f*x]]),x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && NeQ[A,B]
```

3. $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0\,\land\,m<-1$

1: $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0\,\land\,m<-1\,\land\,n>0$

Derivation: Nondegenerate sine recurrence 1a with $C\to 0,\;p\to 0$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0\,\land\,m<-1\,\land\,n>0$, then

$$\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx\,\longrightarrow$$

$$\frac{(B\,a-A\,b)\,\mathrm{Cos}[e+f\,x]\,(a+b\,\mathrm{Sin}[e+f\,x])^{m+1}\,(c+d\,\mathrm{Sin}[e+f\,x])^n}{f\,(m+1)\,(a^2-b^2)}+$$

$$\frac{1}{(m+1)\,(a^2-b^2)}\int (a+b\,\mathrm{Sin}[e+f\,x])^{m+1}\,(c+d\,\mathrm{Sin}[e+f\,x])^{n-1}\cdot$$

$$\left(c\,(a\,A-b\,B)\,(m+1)+d\,n\,(A\,b-a\,B)+(d\,(a\,A-b\,B)\,(m+1)-c\,(A\,b-a\,B)\,(m+2))\,\mathrm{Sin}[e+f\,x]-d\,(A\,b-a\,B)\,(m+n+2)\,\mathrm{Sin}[e+f\,x]^2\right)dx$$

Program code:

```
Int[(a_.+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  (B*a-A*b)*Cos[e+f*x]*(a+b*Sin[e+f*x])^(m+1)*(c+d*Sin[e+f*x])^n/(f*(m+1)*(a^2-b^2)) +
  1/((m+1)*(a^2-b^2))*Int[(a+b*Sin[e+f*x])^(m+1)*(c+d*Sin[e+f*x])^(n-1)*
    Simp[c*(a*A-b*B)*(m+1)+d*n*(A*b-a*B)+(d*(a*A-b*B)*(m+1)-c*(A*b-a*B)*(m+2))*Sin[e+f*x]-d*(A*b-a*B)*(m+n+2)*Sin[e+f*x]^2,x],x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && LtQ[m,-1] && GtQ[n,0]
```

2: $\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx$ when $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0\,\land\,m<-1\,\land\,n\not>0$

Derivation: Nondegenerate sine recurrence 1c with $C\to 0,\;p\to 0$

Rule: If $b\,c-a\,d\neq 0\,\land\,a^2-b^2\neq 0\,\land\,c^2-d^2\neq 0\,\land\,m<-1\,\land\,n\not>0$, then

$$\int (a+b\,\mathrm{Sin}[e+f\,x])^m\,(c+d\,\mathrm{Sin}[e+f\,x])^n\,(A+B\,\mathrm{Sin}[e+f\,x])\,dx\,\longrightarrow$$

$$-\left(\left(b\,(A\,b-a\,B)\,\mathrm{Cos}[e+f\,x]\,(a+b\,\mathrm{Sin}[e+f\,x])^{m+1}\,(c+d\,\mathrm{Sin}[e+f\,x])^{n+1}\right)\Big/\left(f\,(m+1)\,(b\,c-a\,d)\,(a^2-b^2)\right)\right)+$$
$$\frac{1}{(m+1)\,(b\,c-a\,d)\,(a^2-b^2)}\int(a+b\,\mathrm{Sin}[e+f\,x])^{m+1}\,(c+d\,\mathrm{Sin}[e+f\,x])^n\cdot$$
$$\left((a\,A-b\,B)\,(b\,c-a\,d)\,(m+1)+b\,d\,(A\,b-a\,B)\,(m+n+2)+(A\,b-a\,B)\,(a\,d\,(m+1)-b\,c\,(m+2))\,\mathrm{Sin}[e+f\,x]-b\,d\,(A\,b-a\,B)\,(m+n+3)\,\mathrm{Sin}[e+f\,x]^2\right)dx$$

Program code:

```
Int[(a_.+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -(A*b^2-a*b*B)*Cos[e+f*x]*(a+b*Sin[e+f*x])^(m+1)*(c+d*Sin[e+f*x])^(1+n)/(f*(m+1)*(b*c-a*d)*(a^2-b^2)) +
  1/((m+1)*(b*c-a*d)*(a^2-b^2))*Int[(a+b*Sin[e+f*x])^(m+1)*(c+d*Sin[e+f*x])^n*
    Simp[(a*A-b*B)*(b*c-a*d)*(m+1)+b*d*(A*b-a*B)*(m+n+2)+
      (A*b-a*B)*(a*d*(m+1)-b*c*(m+2))*Sin[e+f*x]-
      b*d*(A*b-a*B)*(m+n+3)*Sin[e+f*x]^2,x],x] /;
FreeQ[{a,b,c,d,e,f,A,B,n},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && RationalQ[m] && m<-1 &&
  (EqQ[a,0] && IntegerQ[m] && Not[IntegerQ[n]] || Not[IntegerQ[2*n] && LtQ[n,-1] && (IntegerQ[n] && Not[IntegerQ[m]] || EqQ[a,0])])
```

3. $\int \frac{(a+b\,\mathrm{Sin}[e+f\,x])^m\,(A+B\,\mathrm{Sin}[e+f\,x])}{c+d\,\mathrm{Sin}[e+f\,x]}\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0$

1: $\int \frac{A+B\,\mathrm{Sin}[e+f\,x]}{(a+b\,\mathrm{Sin}[e+f\,x])\,(c+d\,\mathrm{Sin}[e+f\,x])}\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0$

Derivation: Algebraic expansion

Basis: $\frac{A+B\,z}{(a+b\,z)\,(c+d\,z)} == \frac{A\,b-a\,B}{(b\,c-a\,d)\,(a+b\,z)}+\frac{B\,c-A\,d}{(b\,c-a\,d)\,(c+d\,z)}$

Rule: If $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0$, then

$$\int \frac{A+B\,\mathrm{Sin}[e+f\,x]}{(a+b\,\mathrm{Sin}[e+f\,x])\,(c+d\,\mathrm{Sin}[e+f\,x])}\,dx \to \frac{A\,b-a\,B}{b\,c-a\,d}\int \frac{1}{a+b\,\mathrm{Sin}[e+f\,x]}\,dx+\frac{B\,c-A\,d}{b\,c-a\,d}\int \frac{1}{c+d\,\mathrm{Sin}[e+f\,x]}\,dx$$

Program code:

```
Int[(A_.+B_.*sin[e_.+f_.*x_])/((a_.+b_.*sin[e_.+f_.*x_])*(c_.+d_.*sin[e_.+f_.*x_])),x_Symbol] :=
  (A*b-a*B)/(b*c-a*d)*Int[1/(a+b*Sin[e+f*x]),x] + (B*c-A*d)/(b*c-a*d)*Int[1/(c+d*Sin[e+f*x]),x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0]
```

2: $\int \frac{(a+b\,\text{Sin}[e+f\,x])^m\,(A+B\,\text{Sin}[e+f\,x])}{c+d\,\text{Sin}[e+f\,x]}\,dx$ when $b\,c-a\,d\neq 0\wedge a^2-b^2\neq 0\wedge c^2-d^2\neq 0$

Derivation: Algebraic expansion

Basis: $\frac{A+B\,z}{c+d\,z}==\frac{B}{d}-\frac{B\,c-A\,d}{d\,(c+d\,z)}$

Rule: If $b\,c-a\,d\neq 0\wedge a^2-b^2\neq 0\wedge c^2-d^2\neq 0$, then

$$\int \frac{(a+b\,\text{Sin}[e+f\,x])^m\,(A+B\,\text{Sin}[e+f\,x])}{c+d\,\text{Sin}[e+f\,x]}\,dx\,\longrightarrow\,\frac{B}{d}\int (a+b\,\text{Sin}[e+f\,x])^m\,dx-\frac{B\,c-A\,d}{d}\int \frac{(a+b\,\text{Sin}[e+f\,x])^m}{c+d\,\text{Sin}[e+f\,x]}\,dx$$

Program code:

```
Int[(a_.+b_.*sin[e_.+f_.*x_])^m_*(A_.+B_.*sin[e_.+f_.*x_])/(c_.+d_.*sin[e_.+f_.*x_]),x_Symbol] :=
  B/d*Int[(a+b*Sin[e+f*x])^m,x] - (B*c-A*d)/d*Int[(a+b*Sin[e+f*x])^m/(c+d*Sin[e+f*x]),x] /;
FreeQ[{a,b,c,d,e,f,A,B,m},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0]
```

4: $\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,\left(c+d\,\text{Sin}[e+f\,x]\right)^n\left(A+B\,\text{Sin}[e+f\,x]\right)\,dx$ when $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0\,\wedge\,n^2==\frac{1}{4}$

Derivation: Nondegenerate sine recurrence 1b with $A\to A\,c,\ B\to B\,c+A\,d,\ C\to B\,d,\ n\to n-1,\ p\to 0$

Rule: If $b\,c-a\,d\neq 0\,\wedge\,a^2-b^2\neq 0\,\wedge\,c^2-d^2\neq 0\,\wedge\,n^2==\frac{1}{4}$, then

$$\int \sqrt{a+b\,\text{Sin}[e+f\,x]}\,\left(c+d\,\text{Sin}[e+f\,x]\right)^n\left(A+B\,\text{Sin}[e+f\,x]\right)\,dx\ \longrightarrow$$

$$-\frac{2\,B\,\text{Cos}[e+f\,x]\,\sqrt{a+b\,\text{Sin}[e+f\,x]}\,\left(c+d\,\text{Sin}[e+f\,x]\right)^n}{f\,(2\,n+3)}+\frac{1}{2\,n+3}\int\frac{\left(c+d\,\text{Sin}[e+f\,x]\right)^{n-1}}{\sqrt{a+b\,\text{Sin}[e+f\,x]}}\,\cdot$$

$$\left(a\,A\,c\,(2\,n+3)+B\,(b\,c+2\,a\,d\,n)+\left(B\,(a\,c+b\,d)\,(2\,n+1)+A\,(b\,c+a\,d)\,(2\,n+3)\right)\text{Sin}[e+f\,x]+\left(A\,b\,d\,(2\,n+3)+B\,(a\,d+2\,b\,c\,n)\right)\text{Sin}[e+f\,x]^2\right)\,dx$$

Program code:

```
Int[Sqrt[a_.+b_.*sin[e_.+f_.*x_]]*(c_.+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  -2*B*Cos[e+f*x]*Sqrt[a+b*Sin[e+f*x]]*(c+d*Sin[e+f*x])^n/(f*(2*n+3)) +
  1/(2*n+3)*Int[(c+d*Sin[e+f*x])^(n-1)/Sqrt[a+b*Sin[e+f*x]]*
     Simp[a*A*c*(2*n+3)+B*(b*c+2*a*d*n)+
       (B*(a*c+b*d)*(2*n+1)+A*(b*c+a*d)*(2*n+3))*Sin[e+f*x]+
       (A*b*d*(2*n+3)+B*(a*d+2*b*c*n))*Sin[e+f*x]^2,x],x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0] && EqQ[n^2,1/4]
```

5. $\int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{a + b \operatorname{Sin}[e + f x]}\,\sqrt{c + d \operatorname{Sin}[e + f x]}}\,dx$ when $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0$

1. $\int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{a + b \operatorname{Sin}[e + f x]}\,\sqrt{d \operatorname{Sin}[e + f x]}}\,dx$ when $b > 0 \land b^2 - a^2 > 0 \land A == B$

1: $\int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{\operatorname{Sin}[e + f x]}\,\sqrt{a + b \operatorname{Sin}[e + f x]}}\,dx$ when $b > 0 \land b^2 - a^2 > 0 \land A == B$

Derivation: Algebraic expansion

Basis: If $b > 0 \land b - a > 0$, then $\sqrt{a + b z} = \sqrt{1 + z}\,\sqrt{\frac{a+b z}{1+z}}$

Rule: If $b > 0 \land b^2 - a^2 > 0 \land A == B$, then

$$\int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{\operatorname{Sin}[e + f x]}\,\sqrt{a + b \operatorname{Sin}[e + f x]}}\,dx \to \frac{4 A}{f \sqrt{a + b}} \operatorname{EllipticPi}\left[-1, -\operatorname{ArcSin}\left[\frac{\operatorname{Cos}[e + f x]}{1 + \operatorname{Sin}[e + f x]}\right], -\frac{a - b}{a + b}\right]$$

Program code:

```
Int[(A_+B_.*sin[e_.+f_.*x_])/(Sqrt[sin[e_.+f_.*x_]]*Sqrt[a_+b_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  4*A/(f*Sqrt[a+b])*EllipticPi[-1,-ArcSin[Cos[e+f*x]/(1+Sin[e+f*x])],-(a-b)/(a+b)] /;
FreeQ[{a,b,e,f,A,B},x] && GtQ[b,0] && GtQ[b^2-a^2,0] && EqQ[A,B]
```

2: $\int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{a + b \operatorname{Sin}[e + f x]}\,\sqrt{d \operatorname{Sin}[e + f x]}}\,dx$ when $b > 0 \land b^2 - a^2 > 0 \land A == B$

Derivation: Piecewise constant extraction

Basis: $\partial_z \frac{\sqrt{f[z]}}{\sqrt{d f[z]}} == 0$

Rule: If $a^2 - b^2 \neq 0 \land A == B$, then

$$\int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{a + b \operatorname{Sin}[e + f x]} \sqrt{d \operatorname{Sin}[e + f x]}} \, dx \to \frac{\sqrt{\operatorname{Sin}[e + f x]}}{\sqrt{d \operatorname{Sin}[e + f x]}} \int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{\operatorname{Sin}[e + f x]} \sqrt{a + b \operatorname{Sin}[e + f x]}} \, dx$$

Program code:

```
Int[(A_+B_.*sin[e_.+f_.*x_])/(Sqrt[a_+b_.*sin[e_.+f_.*x_]]*Sqrt[d_*sin[e_.+f_.*x_]]),x_Symbol] :=
  Sqrt[Sin[e+f*x]]/Sqrt[d*Sin[e+f*x]]*Int[(A+B*Sin[e+f*x])/(Sqrt[Sin[e+f*x]]*Sqrt[a+b*Sin[e+f*x]]),x] /;
FreeQ[{a,b,e,f,d,A,B},x] && GtQ[b,0] && GtQ[b^2-a^2,0] && EqQ[A,B]
```

2: $\int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{a + b \operatorname{Sin}[e + f x]} \sqrt{c + d \operatorname{Sin}[e + f x]}} \, dx$ when $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0$

Derivation: Algebraic expansion

Basis: $\frac{A+B z}{\sqrt{c+d z}} == \frac{B \sqrt{c+d z}}{d} - \frac{B c-A d}{d \sqrt{c+d z}}$

Rule: If $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0$, then

$$\int \frac{A + B \operatorname{Sin}[e + f x]}{\sqrt{a + b \operatorname{Sin}[e + f x]} \sqrt{c + d \operatorname{Sin}[e + f x]}} \, dx \to \frac{B}{d} \int \frac{\sqrt{c + d \operatorname{Sin}[e + f x]}}{\sqrt{a + b \operatorname{Sin}[e + f x]}} \, dx - \frac{B c - A d}{d} \int \frac{1}{\sqrt{a + b \operatorname{Sin}[e + f x]} \sqrt{c + d \operatorname{Sin}[e + f x]}} \, dx$$

Program code:

```
Int[(A_.+B_.*sin[e_.+f_.*x_])/(Sqrt[a_+b_.*sin[e_.+f_.*x_]]*Sqrt[c_.+d_.*sin[e_.+f_.*x_]]),x_Symbol] :=
  B/d*Int[Sqrt[c+d*Sin[e+f*x]]/Sqrt[a+b*Sin[e+f*x]],x] -
  (B*c-A*d)/d*Int[1/(Sqrt[a+b*Sin[e+f*x]]*Sqrt[c+d*Sin[e+f*x]]),x] /;
FreeQ[{a,b,c,d,e,f,A,B},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0]
```

X: $\int (a + b \operatorname{Sin}[e + f x])^m (c + d \operatorname{Sin}[e + f x])^n (A + B \operatorname{Sin}[e + f x]) \, dx$ when $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0$

Rule: If $b c - a d \neq 0 \land a^2 - b^2 \neq 0 \land c^2 - d^2 \neq 0$, then

$$\int (a + b \operatorname{Sin}[e + f x])^m (c + d \operatorname{Sin}[e + f x])^n (A + B \operatorname{Sin}[e + f x]) \, dx \longrightarrow \int (a + b \operatorname{Sin}[e + f x])^m (c + d \operatorname{Sin}[e + f x])^n (A + B \operatorname{Sin}[e + f x]) \, dx$$

Program code:

```
Int[(a_.+b_.*sin[e_.+f_.*x_])^m_*(c_.+d_.*sin[e_.+f_.*x_])^n_.*(A_.+B_.*sin[e_.+f_.*x_]),x_Symbol] :=
  Unintegrable[(a+b*Sin[e+f*x])^m*(c+d*Sin[e+f*x])^n*(A+B*Sin[e+f*x]),x] /;
FreeQ[{a,b,c,d,e,f,A,B,m,n},x] && NeQ[b*c-a*d,0] && NeQ[a^2-b^2,0] && NeQ[c^2-d^2,0]
```

Rules for integrands of the form $(a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])^p$

x: $\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])^p\,dx$ when $b\,c+a\,d==0\,\land\,a^2-b^2==0\,\land\,m\in\mathbb{Z}$

Derivation: Algebraic simplification

Basis: If $b\,c+a\,d==0\,\land\,a^2-b^2==0$, then $(a+b\,\text{Sin}[z])\,(c+d\,\text{Sin}[z])==a\,c\,\text{Cos}[z]^2$

Rule: If $b\,c+a\,d==0\,\land\,a^2-b^2==0\,\land\,m\in\mathbb{Z}$, then

$$\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])^p\,dx\,\longrightarrow\,a^m\,c^m\int \text{Cos}[e+f\,x]^{2\,m}\,(c+d\,\text{Sin}[e+f\,x])^{n-m}\,(A+B\,\text{Sin}[e+f\,x])^p\,dx$$

Program code:

```
(* Int[(a_+b_.*sin[e_.+f_.*x_])^m_*(c_+d_.*sin[e_.+f_.*x_])^n_*(A_.+B_.*sin[e_.+f_.*x_])^p_,x_Symbol] :=
  a^m*c^m*Int[Cos[e+f*x]^(2*m)*(c+d*Sin[e+f*x])^(n-m)*(A+B*Sin[e+f*x])^p,x] /;
FreeQ[{a,b,c,d,e,f,A,B,n,p},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0] && IntegerQ[m] &&
  Not[IntegerQ[n] && (LtQ[m,0] && GtQ[n,0] || LtQ[0,n,m] || LtQ[m,n,0])] *)
```

```
(* Int[(a_+b_.*cos[e_.+f_.*x_])^m_*(c_+d_.*cos[e_.+f_.*x_])^n_*(A_.+B_.*cos[e_.+f_.*x_])^p_,x_Symbol] :=
  a^m*c^m*Int[Sin[e+f*x]^(2*m)*(c+d*Cos[e+f*x])^(n-m)*(A+B*Cos[e+f*x])^p,x] /;
FreeQ[{a,b,c,d,e,f,A,B,n,p},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0] && IntegerQ[m] &&
  Not[IntegerQ[n] && (LtQ[m,0] && GtQ[n,0] || LtQ[0,n,m] || LtQ[m,n,0])] *)
```

2: $\int (a+b\,\text{Sin}[e+f\,x])^m\,(c+d\,\text{Sin}[e+f\,x])^n\,(A+B\,\text{Sin}[e+f\,x])^p\,dx$ when $b\,c+a\,d==0\,\land\,a^2-b^2==0\,\land\,m\notin\mathbb{Z}\,\land\,n\notin\mathbb{Z}\,\land\,p\notin\mathbb{Z}$

Derivation: Piecewise constant extraction and integration by substitution

Basis: If $b c + a d = 0 \land a^2 - b^2 = 0$, then $\partial_x \frac{\sqrt{a+b \operatorname{Sin}[e+f x]} \sqrt{c+d \operatorname{Sin}[e+f x]}}{\operatorname{Cos}[e+f x]} = 0$

Basis: $\operatorname{Cos}[e+f x] = \frac{1}{f} \partial_x \operatorname{Sin}[e+f x]$

Rule: If $b c + a d = 0 \land a^2 - b^2 = 0 \land m \notin \mathbb{Z} \land n \notin \mathbb{Z}$, then

$$\int (a+b \operatorname{Sin}[e+f x])^m (c+d \operatorname{Sin}[e+f x])^n (A+B \operatorname{Sin}[e+f x])^p \, dx \longrightarrow$$

$$\frac{\sqrt{a+b \operatorname{Sin}[e+f x]} \sqrt{c+d \operatorname{Sin}[e+f x]}}{\operatorname{Cos}[e+f x]} \int \operatorname{Cos}[e+f x] (a+b \operatorname{Sin}[e+f x])^{m-\frac{1}{2}} (c+d \operatorname{Sin}[e+f x])^{n-\frac{1}{2}} (A+B \operatorname{Sin}[e+f x])^p \, dx \longrightarrow$$

$$\frac{\sqrt{a+b \operatorname{Sin}[e+f x]} \sqrt{c+d \operatorname{Sin}[e+f x]}}{f \operatorname{Cos}[e+f x]} \operatorname{Subst}\left[\int (a+b x)^{m-\frac{1}{2}} (c+d x)^{n-\frac{1}{2}} (A+B x)^p \, dx, x, \operatorname{Sin}[e+f x]\right]$$

Program code:

```
Int[(a_+b_.*sin[e_.+f_.*x_])^m_.*(c_+d_.*sin[e_.+f_.*x_])^n_.*(A_.+B_.*sin[e_.+f_.*x_])^p_,x_Symbol] :=
  Sqrt[a+b*Sin[e+f*x]]*Sqrt[c+d*Sin[e+f*x]]/(f*Cos[e+f*x])*
    Subst[Int[(a+b*x)^(m-1/2)*(c+d*x)^(n-1/2)*(A+B*x)^p,x],x,Sin[e+f*x]] /;
FreeQ[{a,b,c,d,e,f,A,B,m,n,p},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0]
```

```
Int[(a_+b_.*cos[e_.+f_.*x_])^m_.*(c_+d_.*cos[e_.+f_.*x_])^n_.*(A_.+B_.*cos[e_.+f_.*x_])^p_,x_Symbol] :=
  -Sqrt[a+b*Cos[e+f*x]]*Sqrt[c+d*Cos[e+f*x]]/(f*Sin[e+f*x])*
    Subst[Int[(a+b*x)^(m-1/2)*(c+d*x)^(n-1/2)*(A+B*x)^p,x],x,Cos[e+f*x]] /;
FreeQ[{a,b,c,d,e,f,A,B,m,n,p},x] && EqQ[b*c+a*d,0] && EqQ[a^2-b^2,0]
```