

Rules for integrands involving trig integral functions

1. $\int u \text{SinIntegral}[a + b x] \, dx$

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Derivation: Integration by parts

Rule:

$$\int \text{SinIntegral}[a + b x] \, dx \rightarrow \frac{(a + b x) \text{SinIntegral}[a + b x]}{b} + \frac{\text{Cos}[a + b x]}{b}$$

Program code:

```
Int[SinIntegral[a_.+b_.*x_],x_Symbol] :=
  (a+b*x)*SinIntegral[a+b*x]/b + Cos[a+b*x]/b;
FreeQ[{a,b},x]
```

```
Int[CosIntegral[a_.+b_.*x_],x_Symbol] :=
  (a+b*x)*CosIntegral[a+b*x]/b - Sin[a+b*x]/b /;
FreeQ[{a,b},x]
```

2. $\int (c + d x)^m \text{SinIntegral}[a + b x] \, dx$

1: $\int \frac{\text{SinIntegral}[b x]}{x} \, dx$

Basis: $\text{SinIntegral}[z] = \frac{1}{2} i (\text{ExpIntegralE}[1, -i z] - \text{ExpIntegralE}[1, i z] + \text{Log}[-i z] - \text{Log}[i z])$

Basis: $\text{CosIntegral}[z] = \frac{1}{2} (-\text{ExpIntegralE}[1, -i z] - \text{ExpIntegralE}[1, i z] - \text{Log}[-i z] - \text{Log}[i z] + 2 \text{Log}[z])$

Rule:

$$\int \frac{\text{SinIntegral}[b x]}{x} \, dx \rightarrow$$

$$\frac{1}{2} b x \operatorname{HypergeometricPFQ}\left[\{1, 1, 1\}, \{2, 2, 2\}, -i b x\right] + \frac{1}{2} b x \operatorname{HypergeometricPFQ}\left[\{1, 1, 1\}, \{2, 2, 2\}, i b x\right]$$

Program code:

```
Int[SinIntegral[b_.x_]/x_,x_Symbol] :=
  1/2*b*x*HypergeometricPFQ[{1,1,1},{2,2,2},-I*b*x] +
  1/2*b*x*HypergeometricPFQ[{1,1,1},{2,2,2},I*b*x] /;
FreeQ[b,x]
```

```
Int[CosIntegral[b_.x_]/x_,x_Symbol] :=
  -1/2*I*b*x*HypergeometricPFQ[{1,1,1},{2,2,2},-I*b*x] +
  1/2*I*b*x*HypergeometricPFQ[{1,1,1},{2,2,2},I*b*x] +
  EulerGamma*Log[x] +
  1/2*Log[b*x]^2 /;
FreeQ[b,x]
```

2: $\int (c + d x)^m \operatorname{SinIntegral}[a + b x] dx$ when $m \neq -1$

Derivation: Integration by parts

Rule: If $m \neq -1$, then

$$\int (c + d x)^m \operatorname{SinIntegral}[a + b x] dx \rightarrow \frac{(c + d x)^{m+1} \operatorname{SinIntegral}[a + b x]}{d (m + 1)} - \frac{b}{d (m + 1)} \int \frac{(c + d x)^{m+1} \operatorname{Sin}[a + b x]}{a + b x} dx$$

Program code:

```
Int[(c_.+d_.x_)^m_.SinIntegral[a_.+b_.x_],x_Symbol] :=
  (c+d*x)^(m+1)*SinIntegral[a+b*x]/(d*(m+1)) -
  b/(d*(m+1))*Int[(c+d*x)^(m+1)*Sin[a+b*x]/(a+b*x),x] /;
FreeQ[{a,b,c,d,m},x] && NeQ[m,-1]
```

```

Int[(c_.+d_.*x_)^m_.*CosIntegral[a_.+b_.*x_],x_Symbol] :=
  (c+d*x)^(m+1)*CosIntegral[a+b*x]/(d*(m+1)) -
  b/(d*(m+1))*Int[(c+d*x)^(m+1)*Cos[a+b*x]/(a+b*x),x] /;
FreeQ[{a,b,c,d,m},x] && NeQ[m,-1]

```

2. $\int \text{SinIntegral}[a + b x]^2 dx$

1: $\int \text{SinIntegral}[a + b x]^2 dx$

Derivation: Integration by parts

Rule:

$$\int \text{SinIntegral}[a + b x]^2 dx \rightarrow \frac{(a + b x) \text{SinIntegral}[a + b x]^2}{b} - 2 \int \text{Sin}[a + b x] \text{SinIntegral}[a + b x] dx$$

Program code:

```

Int[SinIntegral[a_.+b_.*x_]^2,x_Symbol] :=
  (a+b*x)*SinIntegral[a+b*x]^2/b -
  2*Int[Sin[a+b*x]*SinIntegral[a+b*x],x] /;
FreeQ[{a,b},x]

```

```

Int[CosIntegral[a_.+b_.*x_]^2,x_Symbol] :=
  (a+b*x)*CosIntegral[a+b*x]^2/b -
  2*Int[Cos[a+b*x]*CosIntegral[a+b*x],x] /;
FreeQ[{a,b},x]

```

$$2. \int (c + d x)^m \text{SinIntegral}[a + b x]^2 dx$$

$$1: \int x^m \text{SinIntegral}[b x]^2 dx \text{ when } m \in \mathbb{Z}^+$$

Derivation: Integration by parts

Rule: If $m \in \mathbb{Z}^+$, then

$$\int x^m \text{SinIntegral}[b x]^2 dx \rightarrow \frac{x^{m+1} \text{SinIntegral}[b x]^2}{m+1} - \frac{2}{m+1} \int x^m \text{Sin}[b x] \text{SinIntegral}[b x] dx$$

Program code:

```
Int[x_^m_.*SinIntegral[b_.*x_]^2,x_Symbol] :=
  x^(m+1)*SinIntegral[b*x]^2/(m+1) -
  2/(m+1)*Int[x^m*Sin[b*x]*SinIntegral[b*x],x] /;
FreeQ[b,x] && IGtQ[m,0]
```

```
Int[x_^m_.*CosIntegral[b_.*x_]^2,x_Symbol] :=
  x^(m+1)*CosIntegral[b*x]^2/(m+1) -
  2/(m+1)*Int[x^m*Cos[b*x]*CosIntegral[b*x],x] /;
FreeQ[b,x] && IGtQ[m,0]
```

$$2: \int (c + d x)^m \text{SinIntegral}[a + b x]^2 dx \text{ when } m \in \mathbb{Z}^+$$

Derivation: Iterated integration by parts

Rule: If $m \in \mathbb{Z}^+$, then

$$\int (c + d x)^m \text{SinIntegral}[a + b x]^2 dx \rightarrow$$

$$\frac{(a + b x) (c + d x)^m \operatorname{SinIntegral}[a + b x]^2}{b (m + 1)} - \frac{2}{m + 1} \int (c + d x)^m \sin[a + b x] \operatorname{SinIntegral}[a + b x] dx + \frac{(b c - a d) m}{b (m + 1)} \int (c + d x)^{m-1} \operatorname{SinIntegral}[a + b x]^2 dx$$

Program code:

```
Int[(c_+d_.**x_)^m_.*SinIntegral[a_+b_.**x_]^2,x_Symbol] :=
  (a+b*x)*(c+d*x)^m*SinIntegral[a+b*x]^2/(b*(m+1)) -
  2/(m+1)*Int[(c+d*x)^m*Sin[a+b*x]*SinIntegral[a+b*x],x] +
  (b*c-a*d)*m/(b*(m+1))*Int[(c+d*x)^(m-1)*SinIntegral[a+b*x]^2,x] /;
FreeQ[{a,b,c,d},x] && IGtQ[m,0]
```

```
Int[(c_+d_.**x_)^m_.*CosIntegral[a_+b_.**x_]^2,x_Symbol] :=
  (a+b*x)*(c+d*x)^m*CosIntegral[a+b*x]^2/(b*(m+1)) -
  2/(m+1)*Int[(c+d*x)^m*Cos[a+b*x]*CosIntegral[a+b*x],x] +
  (b*c-a*d)*m/(b*(m+1))*Int[(c+d*x)^(m-1)*CosIntegral[a+b*x]^2,x] /;
FreeQ[{a,b,c,d},x] && IGtQ[m,0]
```

x: $\int x^m \text{SinIntegral}[a + b x]^2 dx$ when $m + 2 \in \mathbb{Z}^-$

Derivation: Inverted integration by parts

Rule: If $m + 2 \in \mathbb{Z}^-$, then

$$\int x^m \text{SinIntegral}[a + b x]^2 dx \rightarrow \frac{b x^{m+2} \text{SinIntegral}[a + b x]^2}{a (m+1)} + \frac{x^{m+1} \text{SinIntegral}[a + b x]^2}{m+1} - \frac{2b}{a (m+1)} \int x^{m+1} \text{Sin}[a + b x] \text{SinIntegral}[a + b x] dx - \frac{b (m+2)}{a (m+1)} \int x^{m+1} \text{SinIntegral}[a + b x]^2 dx$$

Program code:

```
(* Int[x_^m_.*SinIntegral[a_+b_.*x_]^2,x_Symbol] :=
  b*x^(m+2)*SinIntegral[a+b*x]^2/(a*(m+1)) +
  x^(m+1)*SinIntegral[a+b*x]^2/(m+1) -
  2*b/(a*(m+1))*Int[x^(m+1)*Sin[a+b*x]*SinIntegral[a+b*x],x] -
  b*(m+2)/(a*(m+1))*Int[x^(m+1)*SinIntegral[a+b*x]^2,x] /;
FreeQ[{a,b},x] && ILtQ[m,-2] *)
```

```
(* Int[x_^m_.*CosIntegral[a_+b_.*x_]^2,x_Symbol] :=
  b*x^(m+2)*CosIntegral[a+b*x]^2/(a*(m+1)) +
  x^(m+1)*CosIntegral[a+b*x]^2/(m+1) -
  2*b/(a*(m+1))*Int[x^(m+1)*Cos[a+b*x]*CosIntegral[a+b*x],x] -
  b*(m+2)/(a*(m+1))*Int[x^(m+1)*CosIntegral[a+b*x]^2,x] /;
FreeQ[{a,b},x] && ILtQ[m,-2] *)
```

$$3. \int u \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

$$1: \int \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

Reference: G&R 5.32.2

Reference: G&R 5.31.1

Derivation: Integration by parts

Rule:

$$\int \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx \rightarrow -\frac{\cos[a + b x] \operatorname{SinIntegral}[c + d x]}{b} + \frac{d}{b} \int \frac{\cos[a + b x] \sin[c + d x]}{c + d x} dx$$

Program code:

```
Int[Sin[a_.+b_.*x_]*SinIntegral[c_.+d_.*x_],x_Symbol] :=
  -Cos[a+b*x]*SinIntegral[c+d*x]/b +
  d/b*Int[Cos[a+b*x]*Sin[c+d*x]/(c+d*x),x] /;
FreeQ[{a,b,c,d},x]
```

```
Int[Cos[a_.+b_.*x_]*CosIntegral[c_.+d_.*x_],x_Symbol] :=
  Sin[a+b*x]*CosIntegral[c+d*x]/b -
  d/b*Int[Sin[a+b*x]*Cos[c+d*x]/(c+d*x),x] /;
FreeQ[{a,b,c,d},x]
```

$$2. \int (e + f x)^m \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

$$1: \int (e + f x)^m \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx \text{ when } m \in \mathbb{Z}^+$$

Derivation: Integration by parts

Rule: If $m \in \mathbb{Z}^+$, then

$$\int (e + f x)^m \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx \rightarrow$$

$$-\frac{(e + f x)^m \cos[a + b x] \operatorname{SinIntegral}[c + d x]}{b} + \frac{d}{b} \int \frac{(e + f x)^m \cos[a + b x] \sin[c + d x]}{c + d x} dx + \frac{f m}{b} \int (e + f x)^{m-1} \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

Program code:

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

```
Int[(e_.+f_.x_)^m_.cos[a_.+b_.x_]CosIntegral[c_.+d_.x_],x_Symbol] :=
  (e+f*x)^m*sin[a+b*x]*CosIntegral[c+d*x]/b -
  d/b*Int[(e+f*x)^m*sin[a+b*x]*Cos[c+d*x]/(c+d*x),x] -
  f*m/b*Int[(e+f*x)^(m-1)*sin[a+b*x]*CosIntegral[c+d*x],x] /;
FreeQ[{a,b,c,d,e,f},x] && IGtQ[m,0]
```

$$2: \int (e + f x)^m \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx \text{ when } m + 1 \in \mathbb{Z}^-$$

Derivation: Inverted integration by parts

Rule: If $m + 1 \in \mathbb{Z}^-$, then

$$\int (e + f x)^m \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx \rightarrow$$

$$\frac{(e + f x)^{m+1} \sin[a + b x] \operatorname{SinIntegral}[c + d x]}{f (m + 1)} -$$

$$\frac{d}{f (m + 1)} \int \frac{(e + f x)^{m+1} \sin[a + b x] \sin[c + d x]}{c + d x} dx - \frac{b}{f (m + 1)} \int (e + f x)^{m+1} \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

Program code:

```
Int[(e_.+f_.**x_)^m_*Sin[a_.+b_.**x_]*SinIntegral[c_.+d_.**x_],x_Symbol] :=
  (e+f*x)^(m+1)*Sin[a+b*x]*SinIntegral[c+d*x]/(f*(m+1)) -
  d/(f*(m+1))*Int[(e+f*x)^(m+1)*Sin[a+b*x]*Sin[c+d*x]/(c+d*x),x] -
  b/(f*(m+1))*Int[(e+f*x)^(m+1)*Cos[a+b*x]*SinIntegral[c+d*x],x] /;
FreeQ[{a,b,c,d,e,f},x] && ILtQ[m,-1]
```

```
Int[(e_.+f_.**x_)^m_*Cos[a_.+b_.**x_]*CosIntegral[c_.+d_.**x_],x_Symbol] :=
  (e+f*x)^(m+1)*Cos[a+b*x]*CosIntegral[c+d*x]/(f*(m+1)) -
  d/(f*(m+1))*Int[(e+f*x)^(m+1)*Cos[a+b*x]*Cos[c+d*x]/(c+d*x),x] +
  b/(f*(m+1))*Int[(e+f*x)^(m+1)*Sin[a+b*x]*CosIntegral[c+d*x],x] /;
FreeQ[{a,b,c,d,e,f},x] && ILtQ[m,-1]
```

$$4. \int u \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

$$1: \int \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

Reference: G&R 5.32.1

Reference: G&R 5.31.2

Derivation: Integration by parts

Rule:

$$\int \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx \rightarrow \frac{\sin[a + b x] \operatorname{SinIntegral}[c + d x]}{b} - \frac{d}{b} \int \frac{\sin[a + b x] \sin[c + d x]}{c + d x} dx$$

Program code:

```
Int[Cos[a_.+b_.*x_]*SinIntegral[c_.+d_.*x_],x_Symbol] :=
  Sin[a+b*x]*SinIntegral[c+d*x]/b -
  d/b*Int[Sin[a+b*x]*Sin[c+d*x]/(c+d*x),x] /;
FreeQ[{a,b,c,d},x]
```

```
Int[Sin[a_.+b_.*x_]*CosIntegral[c_.+d_.*x_],x_Symbol] :=
  -Cos[a+b*x]*CosIntegral[c+d*x]/b +
  d/b*Int[Cos[a+b*x]*Cos[c+d*x]/(c+d*x),x] /;
FreeQ[{a,b,c,d},x]
```

$$2. \int (e + f x)^m \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

$$1: \int (e + f x)^m \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx \text{ when } m \in \mathbb{Z}^+$$

Derivation: Integration by parts

Rule: If $m \in \mathbb{Z}^+$, then

$$\int (e + f x)^m \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx \rightarrow \frac{(e + f x)^m \sin[a + b x] \operatorname{SinIntegral}[c + d x]}{b} - \frac{d}{b} \int \frac{(e + f x)^m \sin[a + b x] \sin[c + d x]}{c + d x} dx - \frac{f m}{b} \int (e + f x)^{m-1} \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

Program code:

```
Int[(e_.+f_.x_)^m_.*Cos[a_.+b_.x_]*SinIntegral[c_.+d_.x_],x_Symbol] :=
  (e+f*x)^m*Sin[a+b*x]*SinIntegral[c+d*x]/b -
  d/b*Int[(e+f*x)^m*Sin[a+b*x]*Sin[c+d*x]/(c+d*x),x] -
  f*m/b*Int[(e+f*x)^(m-1)*Sin[a+b*x]*SinIntegral[c+d*x],x] /;
FreeQ[{a,b,c,d,e,f},x] && IGtQ[m,0]
```

```
Int[(e_.+f_.x_)^m_.*Sin[a_.+b_.x_]*CosIntegral[c_.+d_.x_],x_Symbol] :=
  -(e+f*x)^m*Cos[a+b*x]*CosIntegral[c+d*x]/b +
  d/b*Int[(e+f*x)^m*Cos[a+b*x]*Cos[c+d*x]/(c+d*x),x] +
  f*m/b*Int[(e+f*x)^(m-1)*Cos[a+b*x]*CosIntegral[c+d*x],x] /;
FreeQ[{a,b,c,d,e,f},x] && IGtQ[m,0]
```

$$2: \int (e + f x)^m \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx \text{ when } m + 1 \in \mathbb{Z}^-$$

Derivation: Inverted integration by parts

Rule: If $m + 1 \in \mathbb{Z}^-$, then

$$\int (e + f x)^m \cos[a + b x] \operatorname{SinIntegral}[c + d x] dx \rightarrow$$

$$\frac{(e + f x)^{m+1} \cos[a + b x] \operatorname{SinIntegral}[c + d x]}{f (m + 1)} -$$

$$\frac{d}{f (m + 1)} \int \frac{(e + f x)^{m+1} \cos[a + b x] \sin[c + d x]}{c + d x} dx + \frac{b}{f (m + 1)} \int (e + f x)^{m+1} \sin[a + b x] \operatorname{SinIntegral}[c + d x] dx$$

Program code:

```
Int[(e_.+f_.*x_)^m_.*Cos[a_.+b_.*x_]*SinIntegral[c_.+d_.*x_],x_Symbol] :=
  (e+f*x)^(m+1)*Cos[a+b*x]*SinIntegral[c+d*x]/(f*(m+1)) -
  d/(f*(m+1))*Int[(e+f*x)^(m+1)*Cos[a+b*x]*Sin[c+d*x]/(c+d*x),x] +
  b/(f*(m+1))*Int[(e+f*x)^(m+1)*Sin[a+b*x]*SinIntegral[c+d*x],x] /;
FreeQ[{a,b,c,d,e,f},x] && ILtQ[m,-1]
```

```
Int[(e_.+f_.*x_)^m_.*Sin[a_.+b_.*x_]*CosIntegral[c_.+d_.*x_],x_Symbol] :=
  (e+f*x)^(m+1)*Sin[a+b*x]*CosIntegral[c+d*x]/(f*(m+1)) -
  d/(f*(m+1))*Int[(e+f*x)^(m+1)*Sin[a+b*x]*Cos[c+d*x]/(c+d*x),x] -
  b/(f*(m+1))*Int[(e+f*x)^(m+1)*Cos[a+b*x]*CosIntegral[c+d*x],x] /;
FreeQ[{a,b,c,d,e,f},x] && ILtQ[m,-1]
```

5. $\int \text{SinIntegral}[d(a + b \log[c x^n])] dx$

1: $\int \text{SinIntegral}[d(a + b \log[c x^n])] dx$

Derivation: Integration by parts

Basis: $\partial_x \text{SinIntegral}[d(a + b \log[c x^n])] = \frac{b d n \text{Sin}[d(a + b \log[c x^n])]}{x (d(a + b \log[c x^n]))}$

Rule: If $m \neq -1$, then

$$\int \text{SinIntegral}[d(a + b \log[c x^n])] dx \rightarrow x \text{SinIntegral}[d(a + b \log[c x^n])] - b d n \int \frac{\text{Sin}[d(a + b \log[c x^n])]}{d(a + b \log[c x^n])} dx$$

Program code:

```
Int[SinIntegral[d_.*(a_.*b_.*Log[c_.*x_^n_.])],x_Symbol] :=
  x*SinIntegral[d*(a+b*Log[c*x^n])] - b*d*n*Int[Sin[d*(a+b*Log[c*x^n])]/(d*(a+b*Log[c*x^n])),x] /;
FreeQ[{a,b,c,d,n},x]
```

```
Int[CosIntegral[d_.*(a_.*b_.*Log[c_.*x_^n_.])],x_Symbol] :=
  x*CosIntegral[d*(a+b*Log[c*x^n])] - b*d*n*Int[Cos[d*(a+b*Log[c*x^n])]/(d*(a+b*Log[c*x^n])),x] /;
FreeQ[{a,b,c,d,n},x]
```

2: $\int \frac{\text{SinIntegral}[d(a + b \log[c x^n])]}{x} dx$

Derivation: Integration by substitution

Basis: $\frac{F[\log[c x^n]]}{x} = \frac{1}{n} \text{Subst}[F[x], x, \log[c x^n]] \partial_x \log[c x^n]$

Rule:

$$\int \frac{\text{SinIntegral}[d(a + b \log[c x^n])]}{x} dx \rightarrow \frac{1}{n} \text{Subst}[\text{SinIntegral}[d(a + b x)], x, \log[c x^n]]$$

Program code:

```
Int[F_.*(a_.+b_.*Log[c_.*x_^n_.])/x_,x_Symbol] :=
  1/n*Subst[F[d*(a+b*x)],x,Log[c*x^n]] /;
FreeQ[{a,b,c,d,n},x] && MemberQ[{SinIntegral,CosIntegral},x]
```

3: $\int (e x)^m \text{SinIntegral}[d(a + b \log[c x^n])] dx$ when $m \neq -1$

Derivation: Integration by parts

$$\text{Basis: } \partial_x \text{SinIntegral}[d(a + b \log[c x^n])] = \frac{b d n \text{Sin}[d(a + b \log[c x^n])]}{x (d(a + b \log[c x^n]))}$$

Rule: If $m \neq -1$, then

$$\int (e x)^m \text{SinIntegral}[d(a + b \log[c x^n])] dx \rightarrow \frac{(e x)^{m+1} \text{SinIntegral}[d(a + b \log[c x^n])]}{e (m+1)} - \frac{b d n}{m+1} \int \frac{(e x)^m \text{Sin}[d(a + b \log[c x^n])]}{d(a + b \log[c x^n])} dx$$

Program code:

```
Int[(e_.*x_)^m_.*SinIntegral[d_.*(a_.+b_.*Log[c_.*x_^n_.])],x_Symbol] :=
  (e*x)^(m+1)*SinIntegral[d*(a+b*Log[c*x^n])]/(e*(m+1)) -
  b*d*n/(m+1)*Int[(e*x)^m*Sin[d*(a+b*Log[c*x^n])]/(d*(a+b*Log[c*x^n])),x] /;
FreeQ[{a,b,c,d,e,m,n},x] && NeQ[m,-1]
```

```
Int[(e_.*x_)^m_.*CosIntegral[d_.*(a_.+b_.*Log[c_.*x_^n_.])],x_Symbol] :=
  (e*x)^(m+1)*CosIntegral[d*(a+b*Log[c*x^n])]/(e*(m+1)) -
  b*d*n/(m+1)*Int[(e*x)^m*Cos[d*(a+b*Log[c*x^n])]/(d*(a+b*Log[c*x^n])),x] /;
FreeQ[{a,b,c,d,e,m,n},x] && NeQ[m,-1]
```