1.2 Tutorial 1: Solving Problems

```
> expr := Int(x^2 * sin(x), x);
```

$$expr := \int x^2 \sin(x)\, dx$$

```
> answer := value(expr);
```

$$answer := -x^2 \cos(x) + 2 \cos(x) + 2\, x \sin(x)$$

```
> subs( x=Pi/3, answer );
```

$$-\frac{1}{9}\pi^2 \cos\left(\frac{1}{3}\pi\right) + 2 \cos\left(\frac{1}{3}\pi\right) + \frac{2}{3}\pi \sin\left(\frac{1}{3}\pi\right)$$

```
> simplify(%);
```

$$-\frac{1}{18}\pi^2 + 1 + \frac{1}{3}\pi\sqrt{3}$$

```
> subs(x=Pi/3, answer) -
  subs(x=Pi/4,answer);
```

$$-\frac{1}{9}\pi^2\cos\left(\frac{1}{3}\pi\right)+2\cos\left(\frac{1}{3}\pi\right)+\frac{2}{3}\pi\sin\left(\frac{1}{3}\pi\right)$$
$$+\frac{1}{16}\pi^2\cos\left(\frac{1}{4}\pi\right)-2\cos\left(\frac{1}{4}\pi\right)-\frac{1}{2}\pi\sin\left(\frac{1}{4}\pi\right)$$

```
> simplify(%);
```

$$-\frac{1}{18}\pi^2+1+\frac{1}{3}\pi\sqrt{3}+\frac{1}{32}\pi^2\sqrt{2}-\sqrt{2}-\frac{1}{4}\pi\sqrt{2}$$

```
> expr := Int(x^2 * sin(x-a), x);
```

$$expr := \int x^2\sin(x-a)\,dx$$

```
> answer := value(expr);
```

$$answer := -(x-a)^2\cos(x-a)+2\cos(x-a)$$
$$+2\,(x-a)\sin(x-a)$$
$$+2\,a\,(\sin(x-a)-(x-a)\cos(x-a))$$
$$-a^2\cos(x-a)$$

```
> plot3d(answer, x=-Pi..Pi,
  a=0..1);
```