In[5]:=
```
(* AP Calculus BC | Quiz 43 *)

Integrate[(Cos[theta]) / ((Sin[theta]) ^ 2 - 6 Sin[theta] + 12), theta]
```

Out[5]=
$$\frac{\text{ArcTan}\left[\frac{-3+\text{Sin}[\text{theta}]}{\sqrt{3}}\right]}{\sqrt{3}}$$

Comments : Use u substitution with u = sin (theta). After factoring the bottom, use w = u - 3.

```
(* Problem 1 | A Period *)
```

In[6]:=
```
Integrate[1 / ((x - 3) ^ 2), {x, 0, 4}]
```

Integrate::idiv : Integral of $\frac{1}{(-3+x)^2}$ does not converge on {0, 4}. >>

Out[6]=
$$\int_0^4 \frac{1}{(-3+x)^2}\, dx$$

Comments : This is an improper integral. Split it into two integrals : [0, 3] and [3, 4]. Attempt either integral to conclude that it diverges, so the overall integral diverges as well.

```
(* Problem 2 | A Period *)
```

```
(* Problem 1 | F Period *)
```

In[4]:=
```
Integrate[ArcSin[x], x]
```

Out[4]=
$$\sqrt{1-x^2} + x\,\text{ArcSin}[x]$$

```
Integrate[ArcSin[x], {x, 0, 0.5}]
```

Out[1]=
```
0.127825
```

In[2]:=
```
(Pi / 12) + (Sqrt[3] / 2) - 1 // N
```

Out[2]=
```
0.127825
```

Comment : Solve by Parts. u = arcsin (x) and v' = 1.

```
(* Problem 2 | F Period *)
```

In[3]:=
```
Integrate[1 / (x (x ^ 2 + x + 1)), x]
```

Out[3]=
$$-\frac{\text{ArcTan}\left[\frac{1+2x}{\sqrt{3}}\right]}{\sqrt{3}} + \text{Log}[x] - \frac{1}{2}\text{Log}\left[1+x+x^2\right]$$

Comment : Partial Fractions.