

Exercice 1

$$1) \frac{n \times \binom{n-1}{p-1}}{p} = \frac{n \times \frac{(n-1)!}{(p-1)!(n-1-p+1)!}}{p} = \frac{n \times (n-1)!}{p \times (p-1)! \times (n-p)!} = \frac{n!}{p!(n-p)!} = \binom{n}{p}$$

$$\binom{n}{0} = \frac{n!}{0!n!} = 1$$

2) program td2ex2;

```
function binom(n,p:integer):integer;
begin
  if p=0 then binom:=1
  else binom:=(n*binom(n-1,p-1)) DIV p;
end;
```

```
begin
  writeln('3 parmi 7 vaut ',binom(7,3));
  readln;
end.
```

Exercice 2

$$1) a) \forall n \in \mathbb{N}, \lambda_n = P_{(Y \geq n)}(Y = n) = \frac{P((Y = n) \cap (Y \geq n))}{P(Y \geq n)} = \frac{P(Y = n)}{P(Y \geq n)}$$

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3) a) function f(n:integer):integer;
begin
  if (n= 0) then f:=1
  else f:=n*f(n-1);
end;
```

b) $g(a,n)$ est une suite géométrique de raison a .
Donc $g(a,n) = a^n \times g(0,n) = a^n \times 1 = a^n$

$$c) \text{ Si } Y \longrightarrow P(a) \text{ alors } \forall n \in \mathbb{N}, P(Y = n) = \frac{a^n e^{-a}}{n!} \text{ et } P(Y \geq n) = 1 - P(Y < n) = 1 - \sum_{k=0}^{n-1} \frac{a^k}{k!} e^{-a}$$

```
begin
  writeln('Donner les valeurs de a et n');
  readln(a,n);
  s:=0;
  for k:=0 to n-1 do s:= s + g(a,k)*exp(-a)/f(n);
  writeln('La somme vaut ',s);
  pn:=g(a,n)*exp(-a)/f(n);
  lambda:=pn/(1 - s);
  writeln('Le taux de panne vaut : ',lambda);
  readln;
end.
```