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(*************************************************************
```

Saturated structures: Expected number of base pairs.

From DSV

```
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Clear["P", "S", "R"]
g1 = -S + z + z^2 + z R + z^2 R + u z^2 S + u z^2 S^2;
g2 = -R + u z^2 S + u z^2 R S;
P = Resultant[-S + z + z^2 + z R + z^2 R + u z^2 S + u z^2 S^2 1, -R + u z^2 S + u z^2 R S, R]
P = S u z^2 (z + z^2) - (-1 + S u z^2) (-S + z + z^2 + S u z^2 + S^2 u z^2)
dPdS = Simplify[D[P, S]]
dPdS = -1 + (1 + 4 S) u z^2 - S (2 + 3 S) u^2 z^4
dPdu = Simplify[D[P, u]]
dPdu = S z^2 (1 - 2 S^2 u z^2 + S (2 - 2 u z^2))
S = T + K Sqrt[X];
denom =
 Series[(-1 + (1 + 4 S) (rho - rho X)^2 - S (2 + 3 S) (rho - rho X)^4), {X, 0, 1}] /. X → (1 - z / rho)
```

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This produces an expansion of "denom" as follows

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```

$$\text{denomApprox} = \left(4\,K\,\text{rho}^2 - 2\,K\,\text{rho}^4 - 6\,K\,\text{rho}^4\,T\right)\sqrt{1 - \frac{z}{\text{rho}}}$$

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(*************************************************************
```

Compute numerator in limit as "S,z" approach "T,rho"

```
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K = -3.808190403387938`
T = 1.6568963314781193`
rho = 0.4246873104202721`
numer = Expand[S z^2 (1 - 2 S^2 z^2 + S (2 - 2 z^2))]
numer /. {S → 1.6568963314781193, z → rho} = 0.8145799335195365`;
```

(**********
Compute denominator in limit as "S,z" approach "T,rho"
**********)

```
K = -3.808190403387938`
T = 1.6568963314781193`
rho = 0.4246873104202721`
A = factorOfDenom = (4 K rho^2 - 2 K rho^4 - 6 K rho^4 T) = 1.268090901429324`
B = 1 / A = -0.78858700024805473
```