

Poker Odds Calculations

by Clay S. Turner

$N := \text{combin}(52, 5)$	$N = 2598960$	Number of hands in a deck
$N_{rf} := \text{combin}(1, 1) \cdot \text{combin}(4, 1)$		$N_{rf} = 4$
$N_{sf} := \text{combin}(10, 1) \cdot \text{combin}(4, 1)$		$N_{sf} = 40$
$N_{4k} := \text{combin}(13, 1) \cdot \text{combin}(12, 1) \cdot \text{combin}(4, 4) \cdot \text{combin}(4, 1)$		$N_{4k} = 624$
$N_{fh} := \text{combin}(13, 1) \cdot \text{combin}(12, 1) \cdot \text{combin}(4, 3) \cdot \text{combin}(4, 2)$		$N_{fh} = 3744$
$N_s := \text{combin}(10, 1) \cdot \text{combin}(4, 1) \cdot (\text{combin}(4, 1)^4 - 1)$		$N_s = 10200$
$N_{3k} := \text{combin}(13, 1) \cdot \text{combin}(12, 2) \cdot \text{combin}(4, 3) \cdot \text{combin}(4, 1)^2$		$N_{3k} = 54912$
$N_{2p} := \text{combin}(13, 2) \cdot \text{combin}(11, 1) \cdot \text{combin}(4, 2)^2 \cdot \text{combin}(4, 1)$		$N_{2p} = 123552$
$N_{1p} := \text{combin}(13, 1) \cdot \text{combin}(12, 3) \cdot \text{combin}(4, 2) \cdot \text{combin}(4, 1)^3$		$N_{1p} = 1098240$

Royal Flush	$\frac{N}{N_{rf}} - 1 = 649739$
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Straight Flush	$\frac{N}{N_{sf}} - 1 = 64973$
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4 of a kind	$\frac{N}{N_{4k}} - 1 = 4164$
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Full House	$\frac{N}{N_{fh}} - 1 = 693.167$
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Straight	$\frac{N}{N_s} - 1 = 253.8$
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3 of a kind	$\frac{N}{N_{3k}} - 1 = 46.33$
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2 pair	$\frac{N}{N_{2p}} - 1 = 20.035$
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1 pair	$\frac{N}{N_{1p}} - 1 = 1.366$
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