Answer Key

1a. First, check if $P(1,1) = 1$ works out.
$P(1,1) = 1 \cdot P((1-1, 1-1))$
$= 1 \cdot P(0,0)$ $= 1 \cdot \frac{0!}{0!}$ $= 1 \cdot \frac{1}{1}$ $= 1 \cdot 1$
$= 1$ ✓ Checks out

Next, check for $P(n,1) = n$...
$P(n,1) = n \cdot P((n-1),(1-1))$
$= n \cdot P(n-1,1)$ $= n \cdot \frac{(n-1)!}{(n-1)!}$ $= n \cdot 1$
$= n$ ✓

1b. $P(1,1)$ has been checked in part (a).

Check for $P(n,2) = n \cdot (n-1)$...
$P(n,2) = n \cdot P((n-1),(2-1))$
$= n \cdot \frac{(n-1)!}{(n-1-1)!}$ $= n \cdot \frac{(n-1)!}{(n-2)!}$
$= n \cdot \frac{(n-1)\cdot(n-2)!}{(n-2)!}$ Expanded $(n-1)!$ in the numerator to $(n-1)\cdot(n-2)!$
$= n \cdot (n-1)$ ✓

1c. $P(1,1)$ has been checked in part (a).

Check for $P(n,3) = n \cdot (n-1) \cdot (n-2)$...
$P(n,3) = n \cdot P((n-1),(3-1))$
$= n \cdot \frac{(n-1)!}{(n-1-2)!}$ $= n \cdot \frac{(n-1)!}{(n-3)!}$ Expand $(n-1)$ again...
$= n \cdot \frac{(n-1)(n-2)(n-3)!}{(n-3)!}$
$= n \cdot (n-1) \cdot (n-2)$ ✓