Simplify each of the following.

1. $\frac{5!}{3!} = \frac{5 \times 4 \times 3!}{3!} = \frac{5 \times 4}{1} = 20$

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2. $\frac{27!}{30!} = \frac{27!}{30 \times 29 \times 28 \times 27!} = \frac{1}{30 \times 29 \times 28} = \frac{1}{24,360}$

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3. $\frac{x!}{(x-2)!} = \frac{(x)(x-1)(x-2)!}{(x-2)!} = x(x-1) = x^2 - x$

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4. $\frac{(x+3)!}{(x-2)!} = \frac{(x+3)(x+2)(x+1)(x)(x-1)(x-2)!}{(x-2)!} = (x+3)(x+2)(x+1)(x)(x-1)$

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5. $\frac{n!m!}{(n-1)!(m-1)!} = \frac{(n)(n-1)!(m)(m-1)!}{(n-1)!(m-1)!} = nm$

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6. $\frac{(n+2)!(m-3)!}{(n+3)!(m+1)!}$

$\frac{(n+2)!(m-3)!}{(n+3)!(m+1)!} = \frac{(n+2)!(m-3)!}{(n+3)(n+2)!(m+1)(m)(m-1)(m-2)(m-3)!}$

$\frac{(n+2)!(m-3)!}{(n+3)!(m+1)!} = \frac{1}{(n+3)(m+1)(m)(m-1)(m-2)}$

