- $x = r \cdot \cos(\theta)$
- $y = r \cdot \sin(\theta)$

$\cos^2(\theta)\sin^2(\theta)$

1. $\lim_{(x,y)\to(0,0)} \frac{x^3+y^3}{x^2+y^2} \equiv$

   $\lim_{(r,\theta)\to(0,0)} \frac{\cancel{r^3}(\sin^3(\theta)\cos^3(\theta))}{\cancel{r^2}}$

   $\lim_{(r,\theta)\to(0,0)} \sin^3(\theta)\cos^3(\theta) = 0$

2. $\lim_{(x,y)\to(0,0)} (x^2+y^2)\cdot\ln\left(x^2+y^2\right) \equiv$

   $\lim_{(r,\theta)\to(0,0)} r^2(\cancel{(\cos^2(\theta)\sin^2(\theta))}^{1})\cdot\ln\left(r^2(\cancel{(\cos^2(\theta)\sin^2(\theta))}^{1})\right) \equiv$

   $\lim_{(r,\theta)\to(0,0)} r^2\cdot\ln\left(r^2\right) \equiv$

   $\lim_{(r,\theta)\to(0,0)} r^2\cdot 2\cdot\ln(r) = 0$

3. $\lim_{(x,y)\to(0,0)} \frac{e^{-(x^2+y^2)}-1}{x^2+y^2} \equiv$

   $\lim_{(r,\theta)\to(0,0)} \frac{e^{r^2}-1}{r^2} = 1$

4. $\lim_{(x,y)\to(0,0)} \frac{\sin\left(x^2+y^2\right)}{x^2+y^2} \equiv$

   $\lim_{(r,\theta)\to(0,0)} \frac{\sin\left(r^2\right)}{r^2} = 1$