Test 2 Review:

1. Graph the Vector Function: $\vec{r}(t) = t^2\hat{\imath} + t^4\hat{\jmath} + t^6\hat{k}$ $on\ the\ interval\ t \geq 0$
2. Graph the Vector Function: $\vec{r}(t) = \langle sint, 3, cost\rangle\ on\ the\ interval\ 0 \leq t \leq 2\pi$
3. Find the limit: $\lim_{t\to 0} \langle e^{-t}, \frac{sint}{t}, cost\ \rangle$
4. Find the equation of the tangent line to $\vec{r}(t) = t^5\hat{\imath} + t^4\hat{\jmath} + t^3\hat{k}$ $at\ t = 1$
5. Find the equation of the tangent line to:

   $\vec{r}(t) = (t^2 - 1)\hat{\imath} + (t^2 + 1)\hat{\jmath} + (t + 1)\hat{k}$ $at\ t = 0$
6. Find $\vec{r}(t)\ if\ \vec{r}'(t) = 2e^{2t}\hat{\imath} + 3e^{-t}\hat{\jmath} + e^t\hat{k}\ and\ \vec{r}(0) = \hat{\imath} - \hat{\jmath} + 2\hat{k}$
7. Find the arc length of $\vec{r}(t) = \sqrt{2}t\hat{\imath} + \frac{1}{2}t^2\hat{\jmath} + lnt\hat{k}\ on\ 1 \leq t \leq 2$
8. Find the equation for the Osculating Plane and the Curvature for:

   $\vec{r}(t) = 2\sin(3t)\,\hat{\imath} + t\hat{\jmath} + 2\cos(3t)\,\hat{k}$ $at\ t = \pi$
9. Sketch the Domain of $f(x, y) = \sqrt{y - x}ln(y + x)$
10. Find the Limit of show it D.N.E.: $\lim_{(x,y)\to(0,0)} \frac{\sqrt{xy+4}}{2y+3}$
11. Find the Limit of show it D.N.E.: $\lim_{(x,y)\to(0,0)} \frac{x^2y^2}{x^4+3y^4}$
12. Find **ALL** the Second Partial Derivatives: $f(x, y) = x^4 - 2x^2y^3 + y^2 - 2$
13. Find **ALL** the Second Partial Derivatives: $f(x, y) = e^{-xy}\cos(2x + 3y)$
14. Find Both First Partial Derivatives Implicitly: $x^2 + y^2 - z^2 = 2x(y + z)$
15. Find the Differential $dz\ for\ z = x^2\sin(2y)$