Prelim Review

Name: _____

Math 1920 - Sections 221 and 222 - TA: Itamar Oliveira

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Problems

(1) Find the equation of the plane that contains the lines $\mathbf{r}_1(t) = \langle t, 2t, 3t\rangle$ and $\mathbf{r}_2(t) = \langle 3t, t, 8t\rangle$.

(2) Sketch the set described in cylindrical coordinates.

(a) $r = 4$.

(b) $\theta = \frac{\pi}{3}$.

(c) $z^2 + r^2 \leq 4$.

(3) Evaluate the limit or determine that it does not exist.

(a) $\lim_{(x,y)\to(0,0)} \frac{xy}{\sqrt{x^2+y^2}}$.

(b) $\lim_{(x,y)\to(0,0)} \frac{|x|}{|x|+|y|}$.

(c) $\lim_{(x,y)\to(0,2)} (1+x)^{y/x}$.

(d) $\lim_{(x,y)\to(0,0)} \frac{x^2-y^2}{\sqrt{x^2+y^2}}$.

(4) Suppose that the plane tangent to $z = f(x, y)$ at $(-2, 3, 4)$ has equation $4x + 2y + z = 2$. Estimate $f(-2.1, 3.1)$.

(5) A fighter plane, which can shoot a laser beam straight ahead, travels along the path

$$\mathbf{r}(t) = \langle t - t^3, 12 - t^2, 3 - t\rangle.$$

Show that the pilot cannot hit any target on the x-axis.

(6) Find a vector normal to the surface $3z^3 + x^2y - y^2x = 1$ at $P = (1, -1, 1)$.