(1) Find the value of the line integral \( \int_{C} y\, dx + x^2\, dy \) along the parabola \( C \) defined by \( y = x^2 \) from the point \((0, 0)\) to the point \((1, 1)\).

\( \frac{5}{6} \)

(2) Let \( \mathbf{F} = (yz^2, xz^2, 2xyz) \), and let \( \mathbf{c} \) be a straight-line path from \((1, -2, -3)\) to \((3, 1, 2)\). Find \( \int_{\mathbf{c}} \mathbf{F} \cdot d\mathbf{s} \).

\( 30 \)

(3) Give parametric representations for the elliptic paraboloid \( x = 5y^2 + 2z^2 - 10 \).

\[
x(u, v) = 5u^2 + 2v^2 - 10 \quad y(u, v) = u \quad z(u, v) = v
\]

(4) Parametrize the cylinder \( y^2 + z^2 = 25 \).

\[
\mathbf{r}(u, v) = (u, 5\cos v, 5\sin v)
\]

(5) Find an equation of the tangent plane at the point \((2, 3, 0)\) at the point \((1, 12, -5)\) to the parametric surface

\[
\begin{align*}
x &= u + v \\
y &= 3u^2 \\
z &= u - v.
\end{align*}
\]

\(-6(x - 2) + 2(y - 3) - 6z = 0\)

(6) A wire is parametrized by \( \mathbf{r}(t) = (t \cos t, t \sin t, t) \) for \( \sqrt{2} \leq t \leq \sqrt{7} \). Set up the integral for the length of the wire.

\[
\int_{\sqrt{2}}^{\sqrt{7}} \sqrt{2 + t^2} \, dt
\]

(7) Consider the wire in previous problem. The density of the wire at the point \((x, y, z)\) is \( f(x, y, z) = z \). Find the mass of the wire.

\( \frac{19}{3} \)