**Name:** ________________________
**Date:** ________ **Period:** _______ **Score:** ______

Evaluate:

1) $\int_0^3 (3x^2 - 4x + 1)dx$

$= x^3 - 2x^2 + x \Big|_0^3 = 12 - 0 = \boxed{12}$

2) $\int_3^6 (x^2 - 2x)dx$

$= \frac{x^3}{3} - x^2 \Big|_3^6 = 36 - 0 = \boxed{36}$

3) $\int_1^2 \left(\frac{x^2+1}{x^2}\right) dx = \int_1^2 1 + x^{-2}\, dx$

$= x - \frac{1}{x} \Big|_1^2 = \frac{3}{2} - 0 = \boxed{\frac{3}{2}}$

4) $\int_0^1 \left( z/(z^2+1)^3 \right) dz$

$\int_0^1 \cancel{z} \cdot u^{-3} \cdot \frac{du}{2\cancel{z}}$

$\frac{1}{2}\int_0^1 u^{-3} du = -\frac{1}{4} u^{-2} \Big|_0^1$

$u = z^2 + 1$

$\frac{du}{dz} = 2z$

$dz = \frac{du}{2z}$

$\frac{-1}{4(z^2+1)^2} \Big|_0^1 = -\frac{1}{16} + \frac{1}{4} = \boxed{\frac{3}{16}}$

5) $\int_1^{10} \sqrt{5x-1}\,dx$

$\int_1^{10} u^{1/2} \cdot \frac{du}{5}$

$\frac{1}{5}\int_1^{10} u^{1/2} du = \frac{2}{15} u^{3/2} \Big|_1^{10}$

$u = 5x - 1$

$\frac{du}{dx} = 5$

$dx = \frac{du}{5}$

$\frac{2}{15}\sqrt{(5x-1)^3} \Big|_1^{10} = \frac{686}{15} - \frac{16}{15} = \boxed{\frac{134}{3}}$

6) $\int_{-2}^0 3w\sqrt{4-w^2}\,dw$

$3\int_{-2}^0 \cancel{w}\, u^{1/2} \cdot \frac{-du}{2\cancel{w}}$

$\frac{3}{2}\int_{-2}^0 u^{1/2} du = u^{3/2} \Big|_{-2}^0$

$u = 4 - w^2$

$\frac{du}{dw} = -2w$

$dw = \frac{-du}{2w}$

$\sqrt{(4-w^2)^3} \Big|_{-2}^0 = 8 - 0 = \boxed{8}$

7) $\int_0^{\pi/2} \sin 2x\, dx$

$\int_0^{\pi/2} \sin u \cdot \frac{du}{2}$

$\frac{1}{2}\int_0^{\pi/2} \sin u\, du = -\frac{1}{2}\cos u \Big|_0^{\pi/2}$

$u = 2x$

$\frac{du}{dx} = 2$

$dx = \frac{du}{2}$

$-\frac{1}{2}\cos(2x) \Big|_0^{\frac{\pi}{2}} = \frac{1}{2} + \frac{1}{2} = \boxed{1}$

8) $\int_1^2 t^2\sqrt{t^3+1}\,dt$

$u = t^3 + 1$

$\frac{du}{dt} = 3t^2$

$dt = \frac{du}{3t^2}$

$\int_1^2 \cancel{t^2} u^{1/2} \cdot \frac{du}{3\cancel{t^2}}$

$\frac{1}{3}\int_1^2 u^{1/2} du = \frac{2}{9} u^{3/2} \Big|_1^2$

$\frac{2}{9}\sqrt{(t^3+1)^3} \Big|_1^2 = \boxed{6 - \frac{4\sqrt{2}}{9}}$

9) $\int_0^1 \frac{y^2+2y}{\sqrt[3]{y^3+3y^2+4}}dy$

$u = y^3 + 3y^2 + 4$

$\frac{du}{dy} = 3y^2 + 6y$

$dy = \frac{du}{3(y^2+2y)}$

$\int_0^1 \cancel{y^2+2y} \cdot u^{-1/3} \cdot \frac{du}{3(\cancel{y^2+2y})}$

$\frac{1}{3}\int_0^1 u^{-1/3} du$

$= \frac{1}{2} u^{2/3} \Big|_0^1 = \frac{1}{2}\sqrt[3]{(y^3+3y^2+4)^2} \Big|_0^1 = \boxed{2 - \frac{\sqrt[3]{16}}{2}}$