CORTO #11 - DAVID CORZO

1) $$\int_0^1 \int_0^2 5x\,(y+x^2)^4\,dy\,dx$$

a) $$5x\int_0^2 (y+x^2)^4\,dy = 5x\int u^4\,dy = \frac{5}{5}x\,u^5 =$$

$$u = y + x^2$$
$$du = dy$$

$$= x(y+x^2)^5\Big]_0^2$$

$$= x\left\{(2+x^2)^5 - (0+x^2)^5\right\}$$

$$= x\,(2+x^2)^5 - x\,(x^2)^5$$

b) $$\int \underbrace{x\,(2+x^2)^5}_{①} - \underbrace{x\,(x^2)^5}_{②}\,dx$$

① $$\int_0^2 x\,(2+x^2)^5\,dx = \frac{1}{2}\int u^5\,du = \frac{1}{12}u^6 = \frac{1}{12}(2+x^2)^6$$

$$u = 2 + x^2$$
$$du = 2x\,dx$$
$$\frac{du}{2} = x\,dx$$

$$= \frac{1}{12}\left\{(2+1)^6 - (2)^6\right\}$$

$$= \frac{1}{12}665 = \frac{665}{12}$$

② $$\int x\,(x^2)^5 = \frac{1}{2}\int u^5\,du = \frac{1}{12}u^6 = \frac{1}{4}(x^2)^6$$

$$u = x^2$$
$$\frac{du}{2} = x\,dx$$

$$= \frac{1}{4}\left\{(0^2)^6 - ((1)^2)^6\right\} = \frac{1}{4}$$

$$\frac{665}{12} - \frac{1}{4} = \boxed{\frac{331}{6}}$$