#22.

$$\int_0^1 \int_0^2 y e^{x-y}\, dx\, dy$$

$u = x - y$

$du = dx$

$u(0) = 0 - y$

$u(2) = 2 - y$

$$= \int_0^1 \int_{-y}^{2-y} y e^{u}\, du\, dy$$

$$= \int_0^1 y e^{u} \Big|_{-y}^{2-y} dy$$

$$= \int_0^1 y e^{2-y} - y e^{-y}\, dy$$

y	$+$	e^{2-y}
1	$-$	$-e^{2-y}$
0		e^{2-y}

y	$+$	e^{-y}
1	$-$	$-e^{-y}$
0		e^{-y}

$$= \left[-y e^{2-y} - e^{2-y}\right]_0^1$$

$$- \left[y e^{-y} - e^{-y}\right]_0^1$$

$$= \left[-e - e - (0 - e^2)\right] - \left[-e^{-1} - e^{-1} - (0 - 1)\right]$$

$$= -2e + e^2 + 2e^{-1} - 1 \qquad \approx 1.7$$

32.

$$\int_0^1 \int_0^1 \frac{x}{1+yx}\, dy\, dx$$

$u(y) = 1 + yx$

$du = x\, dy$

$u(0) = 1$

$u(1) = 1 + x$

$$= \int_0^1 \int_1^{1+x} \frac{du}{u}\, dx$$

$$= \int_0^1 \ln|u| \Big]_1^{1+x} dx$$

$$= \int_0^1 \ln|1+x| - \ln(1)\, dx$$

$$= \int_0^1 \ln(1+x)\, dx$$

$u = \ln(1+x)$ $\quad dv = dx$

$du = \frac{1}{1+x} dx$ $\quad v = x$

$$= x \cdot \ln(1+x) \Big|_0^1 - \int_0^1 \frac{x}{1+x}\, dx$$

$\frac{x}{1+x} = \frac{x+1-1}{1+x} = 1 - \frac{1}{1+x}$

$$= \ln(2) - \int_0^1 1 - \frac{1}{1+x}\, dx$$

$$= \ln(2) - \Big[x - \ln(1+x)\Big]_0^1$$

$$= \ln(2) - \Big[1 - \ln(2) - 0\Big] = -1 + 2\ln(2)$$

$$= \ln 4 - 1. \approx 0.4$$

#36.