HW 7.3 p. 518

9 $\int_4^{\infty} e^{-y/2}\,dy$

$u = -y/2$

$(-2)\,du = -\cancel{\tfrac{1}{2}}\,dy\,(-\cancel{2})$

$$\lim_{t\to\infty} \int_4^{t} e^{-y/2}\,dt$$

$$-2 \lim_{t\to\infty} e^{-y/2}\Big|_4^{t}$$

$$-2 \lim_{t\to\infty} \left[e^{-t/2} - e^{-4/2} \right]$$

$$-2 \left[\lim_{t\to\infty} e^{-t/2} - \lim_{t\to\infty} e^{-2} \right]$$

$$-2 \left[\emptyset - e^{-2} \right] = \frac{2}{e^2} = 2e^{-2}$$

(35) $\int_0^3 \frac{dx}{x^2-6x+5} = \int_0^3 \frac{dx}{(x-5)(x-1)}$ $\qquad \frac{1}{(x-5)(x-1)} = \frac{A}{x-5} + \frac{B}{x-1}$

$$\boxed{\lim_{b\to 1^-} \int_0^b \left(\frac{\frac{1}{4}}{x-5} + \frac{-\frac{1}{4}}{x-1} \right) dx + \lim_{b\to 1^+} \int_b^3 \left(\frac{\frac{1}{4}}{x-5} + \frac{-\frac{1}{4}}{x-1} \right) dx}$$

$$= \frac{A(x-1)+B(x-5)}{(x-5)(x-1)}$$

$$= \frac{Ax+Bx-A-5B}{(x-5)(x-1)}$$

$$\lim_{b\to 1^-} \left(\frac{1}{4}\ln|x-5| - \frac{1}{4}\ln|x-1| \right)\Big|_0^b$$

$A+B=0$

$$= \frac{(A+B)x+(-A-5B)}{(x-5)(x-1)}$$

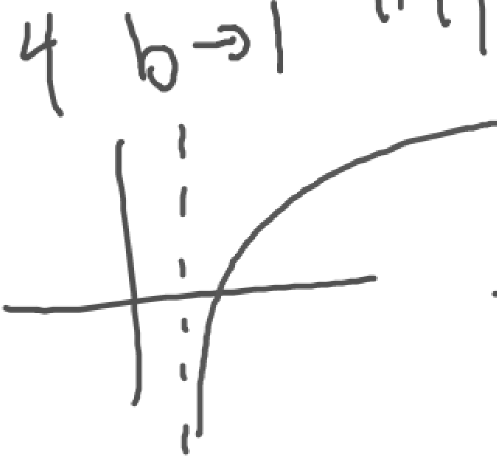
$-A-5B=1$

$A = 1/4 \quad B = -1/4$

$$\lim_{b\to 1^-} \left(\frac{1}{4}\ln|b-5| - \frac{1}{4}\ln|b-1| \right) - \left(\frac{1}{4}\ln|0-5| - \frac{1}{4}\ln|0-1| \right)$$

$y=(x-1)^2$

$$\frac{1}{4} \lim_{b\to 1^-} \ln|b-1|$$



$-\infty$ DIVERGENT

(13) $\int_{-\infty}^{\infty} x e^{-x^2} \, dx$

$$-\frac{1}{2}\left[\lim_{t\to-\infty} e^{-x^2}\Big|_t^0 + \lim_{t\to\infty} e^{-x^2}\Big|_0^t\right]$$

$$-\frac{1}{2}\left[\lim_{t\to-\infty}\left(1-e^{-t^2}\right) + \lim_{t\to\infty}\left(e^{-t^2}-1\right)\right]$$

$$-\frac{1}{2}\left[(1-0)+(0-1)\right]$$

$$-\frac{1}{2}(1+-1) = -\frac{1}{2}(0) = 0$$

CONVERGENT