

$$22) \int_{-\infty}^{\infty} 2xe^{-x^2} dx = -e^{-x^2} \Big|_{-\infty}^{\infty}$$

$$\int_{-\infty}^0 2xe^{-x^2} dx + \int_0^{\infty} 2xe^{-x^2} dx$$

$$\lim_{b \rightarrow -\infty} \left[ -e^{-x^2} \right]_b^0 + \lim_{b \rightarrow \infty} \left[ -e^{-x^2} \right]_0^b$$

$$\lim_{b \rightarrow -\infty} \left[ -1 + e^{-b^2} \right] + \lim_{b \rightarrow \infty} \left[ -e^{-b^2} + 1 \right]$$

$$\left[ -1 + 0 \right] + \left[ 0 + 1 \right] = 0$$

VA:  $\sqrt{1-x^2} = 0$

$$1-x^2=0$$

$$1=x^2$$

$$\pm 1 = x$$

$$26) \int_0^1 \frac{dx}{\sqrt{1-x^2}}$$

$$\lim_{b \rightarrow 1} \int_0^b \frac{dx}{\sqrt{1-x^2}}$$

$$\lim_{b \rightarrow 1} \left[ \arcsin x \right]_0^b = \lim_{b \rightarrow 1} \left[ \arcsin b - \arcsin(0) \right]$$

$$= \frac{\pi}{2} - 0$$

$$\arcsin(1) = \frac{\pi}{2}$$

$$x \neq 0$$

$$\int (-x)^{-1/2} = -2(-x)^{1/2} = -2\sqrt{-x}$$

$$\int (x)^{1/2} = 2(x)^{3/2}$$

$$30) \int_{-1}^4 \frac{dx}{\sqrt{|x|}} = \int_{-1}^0 \frac{dx}{\sqrt{|x|}} + \int_0^4 \frac{dx}{\sqrt{|x|}}$$
$$= \int_{-1}^0 \frac{dx}{\sqrt{-x}} + \int_0^4 \frac{dx}{\sqrt{x}}$$

$$\lim_{b \rightarrow 0} \left[ -2\sqrt{-x} \right]_{-1}^b + \lim_{b \rightarrow 0} \left[ 2\sqrt{x} \right]_b^4$$

$$\lim_{b \rightarrow 0} \left[ -2\sqrt{-b} - (-2\sqrt{-1}) \right] + \lim_{b \rightarrow 0} \left[ 2\sqrt{4} - 2\sqrt{b} \right] = 6$$

$$\text{VA } x=1$$

$$41) \int_0^2 \frac{dx}{1-x} \quad \text{Diverges?}$$

$$\lim_{b \rightarrow 1} \left[ -\ln|1-x| \right]_0^b + \lim_{b \rightarrow 1} \left[ -\ln|1-x| \right]_b^2$$

$$\lim_{b \rightarrow 1} \left[ -\ln|1-b| - 0 \right] + \lim_{b \rightarrow 1} \left[ 0 + \ln|1-b| \right]$$

$$-(-\infty)$$

$$-\infty$$

