AP CALCULUS AB Pg. 407 # 1-22 (x3)

1) $\int x e^{2x} dx$

$u = x \qquad dv = e^{2x} dx$

$du = dx \qquad v = \frac{1}{2} e^{2x}$

$\int x e^{2x} dx = x \cdot \frac{1}{2} e^{2x} - \int \frac{1}{2} e^{2x} dx$

$u = 2x$

$du = 2dx$

$\frac{1}{4} du = \frac{1}{2} dx$

$\int x e^{2x} dx = \frac{1}{2} x e^{2x} - \int \frac{1}{4} e^{u} du$

$\int x e^{2x} dx = \frac{1}{2} x e^{2x} - \frac{1}{4} e^{2x} + C$

4) $\int x \ln x \, dx$

$u = \ln x \qquad dv = x\,dx$

$du = \frac{1}{x} dx \qquad v = \frac{1}{2} x^2$

$\int x \ln x \, dx = \frac{1}{2} x^2 \ln x - \int \frac{1}{2} x^2 \cdot \frac{1}{x} dx$

$\int x \ln x \, dx = \frac{1}{2} x^2 \ln x - \int \frac{1}{2} x \, dx$

$= \frac{1}{2} x^2 \ln x - \frac{\frac{1}{2} x^2}{2} + C$

$= \frac{1}{2} x^2 \ln x - \frac{1}{4} x^2 + C$

7) $\int (\ln x)^2 dx$

$u = (\ln x)^2 \qquad dv = dx$

$du = 2\ln x \cdot \frac{1}{x} dx \qquad v = x$

$du = \frac{2}{x}\ln x \, dx$

$\int (\ln x)^2 dx = (\ln x)^2 \cdot x - \int x \cdot \frac{2}{x} \ln x \, dx$

$= x(\ln x)^2 - \int 2\ln x \, dx$

$= x(\ln x)^2 - 2\int \ln x \, dx$

$u = \ln x \qquad dv = dx$

$du = \frac{1}{x} dx \qquad v = x$

$= x(\ln x)^2 - 2\left[x\ln x - \int x \cdot \frac{1}{x} dx\right]$

$= x(\ln x)^2 - 2x\ln x + 2\int dx$

$= x(\ln x)^2 - 2x\ln x + 2x + C$

10) $\int \theta \sec^2\theta \, d\theta$

$u = \theta \qquad dv = \sec^2\theta \, d\theta$

$du = d\theta \qquad v = \tan\theta$

$\int \theta \sec^2\theta \, d\theta = \theta \tan\theta - \int \tan\theta \, d\theta$

$= \theta\tan\theta - \int \frac{\sin\theta}{\cos\theta} d\theta$

$u = \cos\theta$

$du = -\sin\theta \, d\theta$

$-du = \sin\theta \, d\theta$

$= \theta\tan\theta - \int -\frac{du}{u}$

$= \theta\tan\theta + \ln|u| + C$

$= \theta\tan\theta + \ln|\cos\theta| + C$

13) $\int e^{2\theta} \sin 3\theta \, d\theta$

$u = \sin 3\theta \qquad dv = e^{2\theta} d\theta$

$du = 3\cos 3\theta \, d\theta \qquad v = \frac{1}{2} e^{2\theta}$

$\int e^{2\theta} \sin 3\theta \, d\theta = \frac{1}{2} e^{2\theta} \sin 3\theta - \int \frac{1}{2} e^{2\theta} \cdot 3\cos 3\theta \, d\theta$

$= \frac{1}{2} e^{2\theta} \sin 3\theta - \frac{3}{2} \int e^{2\theta} \cos 3\theta \, d\theta$

$u = \cos 3\theta \qquad dv = e^{2\theta} d\theta$

$du = -3\sin 3\theta \, d\theta \qquad v = \frac{1}{2} e^{2\theta}$

$= \frac{1}{2} e^{2\theta} \sin 3\theta - \frac{3}{2} \left[\frac{1}{2} e^{2\theta} \cos 3\theta - \int \frac{1}{2} e^{2\theta} (-3\sin 3\theta) d\theta \right]$

$= \frac{1}{2} e^{2\theta} \sin 3\theta - \frac{3}{2} \left[\frac{1}{2} e^{2\theta} \cos 3\theta + \frac{3}{2} \int e^{2\theta} \sin 3\theta \, d\theta \right]$

$\int e^{2\theta} \sin 3\theta \, d\theta = \frac{1}{2} e^{2\theta} \sin 3\theta - \frac{3}{4} e^{2\theta} \cos 3\theta - \frac{9}{4} \int e^{2\theta} \sin 3\theta \, d\theta$

$\frac{13}{4} \int e^{2\theta} \sin 3\theta \, d\theta = \frac{1}{2} e^{2\theta} \sin 3\theta - \frac{3}{4} e^{2\theta} \cos 3\theta + C$

$\int e^{2\theta} \sin 3\theta \, d\theta = \frac{2}{13} e^{2\theta} \sin 3\theta - \frac{3}{13} e^{2\theta} \cos 3\theta + C$

or

$\int e^{2\theta} \sin 3\theta \, d\theta = \frac{1}{13} e^{2\theta} \left[2\sin 3\theta - 3\cos 3\theta \right] + C$

16) $\int_1^4 \sqrt{t} \ln t \, dt$

$u = \ln t \qquad dv = t^{1/2} dt$

$du = \frac{1}{t} dt \qquad v = \frac{t^{3/2}}{3/2} = \frac{2}{3} t^{3/2}$

$\int_1^4 t^{1/2} \ln t \, dt = \left[\frac{2}{3} t^{3/2} \ln t \right]_1^4 - \int_1^4 \frac{2}{3} t^{3/2} \cdot t^{-1} dt$

$= \left[\frac{2}{3} t^{3/2} \ln t \right]_1^4 - \frac{2}{3} \int_1^4 t^{1/2} dt$

$= \left[\frac{2}{3} t^{3/2} \ln t \right]_1^4 - \left[\frac{2}{3} \cdot \frac{2}{3} t^{3/2} \right]_1^4$

$= \left[\frac{2}{3} t^{3/2} \ln t \right]_1^4 - \left[\frac{4}{9} t^{3/2} \right]_1^4$

$= \left[\frac{16}{3} \ln 4 - \frac{2}{3} \ln 1 \right] - \left[\frac{32}{9} - \frac{4}{9} \right]$

$= \frac{16}{3} \ln 4 - \frac{28}{9}$

≈ 4.282

19) $\int_0^{1/2} \sin^{-1} x \, dx$

$u = \sin^{-1} x \qquad dv = dx$

$du = \frac{1}{\sqrt{1-x^2}} dx \qquad v = x$

$\int_0^{1/2} \sin^{-1} x \, dx = \left[x \sin^{-1} x\right]_0^{1/2} - \int_0^{1/2} x \cdot \frac{1}{\sqrt{1-x^2}} dx$

$\int_0^{1/2} \sin^{-1} x \, dx = \left[x \sin^{-1} x\right]_0^{1/2} - \int_0^{1/2} x (1-x^2)^{-1/2} dx$

$u = 1-x^2 \qquad x = 0 \Rightarrow u = 1$

$du = -2x\,dx \qquad x = \frac{1}{2} \Rightarrow u = \frac{3}{4}$

$-\frac{1}{2} du = x\,dx$

$\int_0^{1/2} \sin^{-1} x \, dx = \left[x \sin^{-1} x\right]_0^{1/2} - \int_1^{3/4} -\frac{1}{2} u^{-1/2} du$

$\int_0^{1/2} \sin^{-1} x \, dx = \left[x \sin^{-1} x\right]_0^{1/2} - \left[\frac{-\frac{1}{2} u^{1/2}}{1/2}\right]_1^{3/4}$

$\int_0^{1/2} \sin^{-1} x \, dx = \left[x \sin^{-1} x\right]_0^{1/2} - \left[-\sqrt{u}\right]_1^{3/4}$

$= \left[\frac{1}{2} \cdot \frac{\pi}{6} - 0 \cdot 0\right] - \left[-\frac{\sqrt{3}}{2} - (-1)\right]$

$= \frac{\pi}{12} - \left[1 - \frac{\sqrt{3}}{2}\right]$

$= \frac{\pi}{12} + \frac{\sqrt{3}}{2} - 1$

$= \frac{\pi}{12} + \frac{6\sqrt{3}}{12} - \frac{12}{12}$

$= \frac{1}{12}(\pi + 6\sqrt{3} - 12)$

≈ 0.128

AP CALCULUS AB Pg. 407 #1-28 (x3)

22) $\int_0^1 x \tan^{-1} x \, dx$

$u = \tan^{-1} x \qquad dv = x\,dx$

$du = \frac{1}{1+x^2}\,dx \qquad v = \frac{1}{2}x^2$

$$\int_0^1 x \tan^{-1} x \, dx = \left[\frac{1}{2}x^2 \tan^{-1} x\right]_0^1 - \int_0^1 \frac{x^2}{2} \cdot \frac{1}{1+x^2}\,dx$$

$$\int_0^1 x \tan^{-1} x \, dx = \left[\frac{1}{2}x^2 \tan^{-1} x\right]_0^1 - \int_0^1 \frac{1}{2} \cdot \frac{x^2}{1+x^2}\,dx$$

$$\int_0^1 x \tan^{-1} x \, dx = \left[\frac{1}{2}x^2 \tan^{-1} x\right]_0^1 - \frac{1}{2}\int_0^1 \frac{(1+x^2)-1}{1+x^2}\,dx$$

$$= \left[\frac{1}{2}x^2 \tan^{-1} x\right]_0^1 - \frac{1}{2}\int_0^1 \left(\frac{1+x^2}{1+x^2} - \frac{1}{1+x^2}\right)dx$$

$$= \left[\frac{1}{2}x^2 \tan^{-1} x\right]_0^1 - \frac{1}{2}\int_0^1 1\,dx + \frac{1}{2}\int_0^1 \frac{1}{1+x^2}\,dx$$

$$= \left[\frac{1}{2}x^2 \tan^{-1} x\right]_0^1 - \left[\frac{1}{2}x\right]_0^1 + \left[\frac{1}{2}\tan^{-1} x\right]_0^1$$

$$= \left[\frac{1}{2}\cdot\frac{\pi}{4} - 0\right] - \left[\frac{1}{2} - 0\right] + \left[\frac{1}{2}\cdot\frac{\pi}{4} - 0\right]$$

$$= \frac{\pi}{8} - \frac{1}{2} + \frac{\pi}{8}$$

$$= \frac{2\pi}{8} - \frac{1}{2}$$

$$= \frac{\pi}{4} - \frac{1}{2}$$

$$\approx 0.285$$

AP CALCULUS AB   Pg. 407 #2-~~29~~ 23 (x3)

2) $\int x\cos x\,dx$

$$u = x \qquad dv = \cos x\,dx$$
$$du = dx \qquad v = \sin x$$

$$\begin{aligned}\int x\cos x\,dx &= x\sin x - \int \sin x\,dx\\ &= x\sin x - (-\cos x) + C\\ &= x\sin x + \cos x + C\end{aligned}$$

5) $\int x^2\cos 3x\,dx$

$$u = x^2 \qquad dv = \cos 3x\,dx$$
$$du = 2x\,dx \qquad v = \tfrac{1}{3}\sin 3x$$

$$\begin{aligned}\int x^2\cos 3x\,dx &= x^2\cdot\tfrac{1}{3}\sin 3x - \int \tfrac{1}{3}\sin 3x\cdot 2x\,dx\\ &= \tfrac{1}{3}x^2\sin 3x - \int \tfrac{2}{3}x\sin 3x\,dx\\ &= \tfrac{1}{3}x^2\sin 3x - \tfrac{2}{3}\int x\sin 3x\,dx\end{aligned}$$

$$u = x \qquad dv = \sin 3x\,dx$$
$$du = dx \qquad v = -\tfrac{1}{3}\cos 3x$$

$$\begin{aligned}&= \tfrac{1}{3}x^2\sin 3x - \tfrac{2}{3}\left[x\cdot -\tfrac{1}{3}\cos 3x - \int -\tfrac{1}{3}\cos 3x\,dx\right]\\ &= \tfrac{1}{3}x^2\sin 3x - \tfrac{2}{3}\left[-\tfrac{1}{3}x\cos 3x + \tfrac{1}{3}\int \cos 3x\,dx\right]\\ &= \tfrac{1}{3}x^2\sin 3x + \tfrac{2}{9}x\cos 3x - \tfrac{2}{9}\int \cos 3x\,dx\\ &= \tfrac{1}{3}x^2\sin 3x + \tfrac{2}{9}x\cos 3x - \tfrac{2}{9}\cdot\tfrac{1}{3}\sin 3x + C\\ &= \tfrac{1}{3}x^2\sin 3x + \tfrac{2}{9}x\cos 3x - \tfrac{2}{27}\sin 3x + C\end{aligned}$$

AP CALCULUS AB Pg. 407 #2-29 (x3)

8) $\int \sin^{-1}x \, dx$

$u = \sin^{-1}x \qquad dv = dx$

$du = \frac{1}{\sqrt{1-x^2}}\,dx \qquad v = x$

$du = (1-x^2)^{-1/2}\,dx$

$$\int \sin^{-1}x \, dx = x\sin^{-1}x - \int x(1-x^2)^{-1/2}\,dx$$

$u = 1-x^2$

$du = -2x\,dx$

$-\frac{1}{2}du = x\,dx$

$$\int \sin^{-1}x\,dx = x\sin^{-1}x - \int -\tfrac{1}{2}u^{-1/2}\,du$$

$$= x\sin^{-1}x + \tfrac{1}{2}\int u^{-1/2}\,du$$

$$= x\sin^{-1}x + \tfrac{1}{2}\cdot\frac{u^{1/2}}{1/2} + C$$

$$= x\sin^{-1}x + (1-x^2)^{1/2} + C$$

$$= x\sin^{-1}x + \sqrt{1-x^2} + C$$

11) $\int t^2 \ln t \, dt$

$u = \ln t \qquad dv = t^2\,dt$

$du = \frac{1}{t}\,dt \qquad v = \frac{1}{3}t^3$

$$\int t^2\ln t\,dt = \tfrac{1}{3}t^3\ln t - \int \tfrac{1}{3}t^3\cdot\tfrac{1}{t}\,dt$$

$$= \tfrac{1}{3}t^3\ln t - \tfrac{1}{3}\int t^2\,dt$$

$$= \tfrac{1}{3}t^3\ln t - \tfrac{1}{3}\cdot\tfrac{1}{3}t^3 + C$$

$$= \tfrac{1}{3}t^3\ln t - \tfrac{1}{9}t^3 + C$$

or

$$= \tfrac{3}{9}t^3\ln t - \tfrac{1}{9}t^3 + C$$

$$= \tfrac{1}{9}t^3(3\ln t - 1) + C$$

AP CALCULUS AB Pg. 407 # 2-29 (x3)

14) $\int e^{-\theta}\cos 3\theta \, d\theta$

$u = \cos 3\theta \qquad dv = e^{-\theta} d\theta$

$du = -3\sin 3\theta \, d\theta \qquad v = -e^{-\theta}$

$$\int e^{-\theta}\cos 3\theta \, d\theta = -e^{-\theta}\cos 3\theta - \int 3e^{-\theta}\sin 3\theta \, d\theta$$

$$= -e^{-\theta}\cos 3\theta - 3\int e^{-\theta}\sin 3\theta \, d\theta$$

$u = \sin 3\theta \qquad dv = e^{-\theta} d\theta$

$du = 3\cos 3\theta \, d\theta \qquad v = -e^{-\theta}$

$$= -e^{-\theta}\cos 3\theta - 3\left[-e^{-\theta}\sin 3\theta - \int -3e^{-\theta}\cos 3\theta \, d\theta\right]$$

$$= -e^{-\theta}\cos 3\theta + 3e^{-\theta}\sin 3\theta + 3\int -3e^{-\theta}\cos 3\theta \, d\theta$$

$$\int e^{-\theta}\cos 3\theta \, d\theta = -e^{-\theta}\cos 3\theta + 3e^{-\theta}\sin 3\theta - 9\int e^{-\theta}\cos 3\theta \, d\theta$$

$$\int e^{-\theta}\cos 3\theta \, d\theta + 9\int e^{-\theta}\cos 3\theta \, d\theta = -e^{-\theta}\cos 3\theta + 3e^{-\theta}\sin 3\theta$$

$$10\int e^{-\theta}\cos 3\theta \, d\theta = 3e^{-\theta}\sin 3\theta - e^{-\theta}\cos 3\theta$$

$$\int e^{-\theta}\cos 3\theta \, d\theta = \frac{3}{10}e^{-\theta}\sin 3\theta - \frac{1}{10}e^{-\theta}\cos 3\theta + C$$

$$= \frac{1}{10}e^{-\theta}(3\sin 3\theta - \cos 3\theta) + C$$

Pg. 407 # 2-23 (x3)

17) $\int_0^{\pi/2} x\cos 2x\,dx$

$u = x \qquad dv = \cos 2x\,dx$

$du = dx \qquad v = \frac{1}{2}\sin 2x$

$$\int_0^{\pi/2} x\cos 2x\,dx = \left[\frac{1}{2}x\sin 2x - \int \frac{1}{2}\sin 2x\,dx\right]_0^{\pi/2}$$

$$\int_0^{\pi/2} x\cos 2x\,dx = \left[\frac{1}{2}x\sin 2x - \frac{1}{2}\int \sin 2x\,dx\right]_0^{\pi/2}$$

$$= \left[\frac{1}{2}x\sin 2x - \frac{1}{2}\cdot -\frac{1}{2}\cos 2x\right]_0^{\pi/2}$$

$$= \left[\frac{1}{2}x\sin 2x + \frac{1}{4}\cos 2x\right]_0^{\pi/2}$$

$$= \left[(-1/4) - (+1/4)\right]$$

$$= -1/2$$

Pg. 407 # 2-23 (x3)

#20) $\int_{\pi/4}^{\pi/2} x\csc^2 x\,dx =$

$u = x \qquad dv = \csc^2 x\,dx$

$du = dx \qquad v = -\cot x$

$$= \left[-x\cot x - \int -\cot x\,dx\right]_{\pi/4}^{\pi/2}$$

$$= \left[-x\cot x + \int \frac{\cos x}{\sin x}\,dx\right]_{\pi/4}^{\pi/2}$$

$$= \left[-x\cot x + \ln|\sin x|\right]_{\pi/4}^{\pi/2}$$

$$= \left[\left(-\tfrac{\pi}{2}\cot\tfrac{\pi}{2} + \ln|\sin\tfrac{\pi}{2}|\right) - \left(-\tfrac{\pi}{4}\cot\tfrac{\pi}{4} + \ln|\sin\tfrac{\pi}{4}|\right)\right]$$

$$= \left[(0+0) - \left(-\pi/4 + \ln\tfrac{1}{\sqrt{2}}\right)\right]$$

$$= \pi/4 - \ln\tfrac{1}{\sqrt{2}}$$

$$= \pi/4 - \ln 2^{-1/2}$$

$$= \pi/4 + \tfrac{1}{2}\ln 2$$

$$\approx 1.132$$

Pg. 407 # 2-23 (x3)

23) $\int_0^1 (x^2-1)e^x\,dx =$

$u = x^2-1 \qquad dv = e^x dx$

$du = 2x\,dx \qquad v = e^x$

$= \left[(x^2-1)e^x - \int 2x\,e^x dx\right]_0^1$

$= \left[(x^2-1)e^x - 2\int x\,e^x dx\right]_0^1$

$u = x \qquad dv = e^x dx$

$du = dx \qquad v = e^x$

$= \left[(x^2-1)e^x - 2\left(x e^x - \int e^x dx\right)\right]_0^1$

$= \left[(x^2-1)e^x - 2xe^x + 2e^x\right]_0^1$

$= \left[e^x(x^2-1-2x+2)\right]_0^1$

$= \left[e^x(x^2-2x+1)\right]_0^1$

$= \left[e^x(x-1)^2\right]_0^1$

$= [0-1]$

$= -1$

AP CALCULUS AB Pg. 407 # 3-30 (x3)

3) $\int x \sin 4x \, dx$

$u = x \qquad dv = \sin 4x \, dx$

$du = dx \qquad v = -\frac{1}{4}\cos 4x$

$$\int x \sin 4x \, dx = -\frac{1}{4}x\cos 4x - \int -\frac{1}{4}\cos 4x \, dx$$

$$= -\frac{1}{4}x\cos 4x + \frac{1}{4}\int \cos 4x \, dx$$

$$= -\frac{1}{4}x\cos 4x + \frac{1}{4}\cdot\frac{1}{4}\sin 4x + C$$

$$= -\frac{1}{4}x\cos 4x + \frac{1}{16}\sin 4x + C$$

6) $\int x^2 \sin 2x \, dx$

$u = x^2 \qquad dv = \sin 2x \, dx$

$du = 2x \, dx \qquad v = -\frac{1}{2}\cos 2x$

$$\int x^2 \sin 2x \, dx = -\frac{1}{2}x^2\cos 2x - \int -x\cos 2x \, dx$$

$$= -\frac{1}{2}x^2\cos 2x + \int x\cos 2x \, dx$$

$u = x \qquad dv = \cos 2x \, dx$

$du = dx \qquad v = \frac{1}{2}\sin 2x$

$$= -\frac{1}{2}x^2\cos 2x + \left[\frac{1}{2}x\sin 2x - \int \frac{1}{2}\sin 2x \, dx\right]$$

$$= -\frac{1}{2}x^2\cos 2x + \frac{1}{2}x\sin 2x - \frac{1}{2}\int \sin 2x \, dx$$

$$= -\frac{1}{2}x^2\cos 2x + \frac{1}{2}x\sin 2x - \frac{1}{2}\cdot -\frac{1}{2}\cos 2x + C$$

$$= -\frac{1}{2}x^2\cos 2x + \frac{1}{2}x\sin 2x + \frac{1}{4}\cos 2x + C$$

AP CALCULUS AB   Pg. 407 # 3-30 (x3)

9) $\int \theta \sin\theta \cos\theta \, d\theta$

$\int \theta \cdot \frac{1}{2} \cdot 2\sin\theta\cos\theta \, d\theta$

$\int \frac{1}{2}\theta \sin 2\theta \, d\theta$

$u = \frac{1}{2}\theta \qquad dv = \sin 2\theta \, d\theta$

$du = \frac{1}{2} d\theta \qquad v = -\frac{1}{2}\cos 2\theta$

$$\int \frac{1}{2}\theta \sin 2\theta \, d\theta = -\frac{1}{4}\theta\cos 2\theta - \int -\frac{1}{4}\cos 2\theta \, d\theta$$

$$= -\frac{1}{4}\theta\cos 2\theta + \frac{1}{4}\int \cos 2\theta \, d\theta$$

$$= -\frac{1}{4}\theta\cos 2\theta + \frac{1}{4}\cdot\frac{1}{2}\sin 2\theta + C$$

$$= -\frac{1}{4}\theta\cos 2\theta + \frac{1}{8}\sin 2\theta + C$$

or

$$= -\frac{2}{8}\theta\cos 2\theta + \frac{1}{8}\sin 2\theta + C$$

$$= \frac{1}{8}(\sin 2\theta - 2\theta\cos 2\theta) + C$$

12) $\int t^3 e^t \, dt$

$u = t^3 \qquad dv = e^t dt$

$du = 3t^2 dt \qquad v = e^t$

$$\int t^3 e^t dt = t^3e^t - \int 3t^2 e^t dt$$

$u = 3t^2 \qquad dv = e^t dt$

$du = 6t\,dt \qquad v = e^t$

$$= t^3e^t - \left[3t^2e^t - \int 6te^t dt\right]$$

$$= t^3e^t - 3t^2e^t + 6\int te^t dt$$

$u = t \qquad dv = e^t dt$

$du = dt \qquad v = e^t$

$$= t^3e^t - 3t^2e^t + 6\left[te^t - \int e^t dt\right]$$

$$= t^3e^t - 3t^2e^t + 6te^t - 6\int e^t dt$$

$$= t^3e^t - 3t^2e^t + 6te^t - 6e^t + C$$

or

$$= e^t(t^3 - 3t^2 + 6t - 6) + C$$

AP CALCULUS AB   Pg. 407 # 3–30 (×3)

15) $\int_0^1 t e^{-t} dt$

$u = t \qquad dv = e^{-t} dt$

$du = dt \qquad v = -e^{-t}$

$$\int_0^1 t e^{-t} dt = -te^{-t} - \int -e^{-t} dt$$

$$= -te^{-t} + \int e^{-t} dt$$

$$= -te^{-t} - e^{-t} + C$$

$$\left[-te^{-t} - e^{-t}\right]_0^1 = \left[-e^{-1} - e^{-1}\right] - \left[0 - e^{0}\right]$$

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

$$= -\frac{2}{e} + 1 \quad \text{or} \quad 1 - \frac{2}{e}$$

$$\approx 0.264$$