Calculus, 2017-1-ME-2

Name: **Sequence Number:**

1°). Evaluate the following Integrations: (total 100%, each 10% ($\times 10$))

a°). $\int_{0}^{\pi/2} (\mathbf{x} \sin \mathbf{x}) \mathbf{dx} = 1$

b°). $\int_{\pi/6}^{\pi/4} \frac{\cos^3 \mathbf{x}}{\sin \mathbf{x}} \mathbf{dx} = \frac{\ln 2}{2} - \frac{1}{8}$

c°). $\int_{0}^{1/2} \cos^3 \pi \mathbf{x} \mathbf{dx} = \frac{2}{3\pi}$

d°). $\int_{0}^{4} \sqrt{4^2 - \mathbf{x}^2} \mathbf{dx} = 4\pi$

e°). $\int_{0}^{1} \mathbf{e}^{-\mathbf{x}} \cos \mathbf{x} \mathbf{dx} = \frac{1+e^{-1} \sin 1 - e^{-1} \cos 1}{2}$

f°). $\int_{0}^{\pi/4} \tan \mathbf{x} \sec^2 \mathbf{x} \mathbf{dx} = 1/2$

g°). $\int_{1}^{\infty} \sin(\ln \mathbf{x}) \mathbf{dx} =$ fails to exist

h°). $\int_{0}^{1/2} \frac{\sqrt{\mathbf{x}}\mathbf{dx}}{1-\sqrt{\mathbf{x}}} = -\sqrt{2} - \frac{1}{2} - 2 \ln |\sqrt{1/2} - 1|$

i°). $\int_{0}^{\pi/4} \sin 3\mathbf{x} \sin 2\mathbf{x} \mathbf{dx} = \frac{3\sqrt{2}}{10}$

j°). $\int_{0}^{1} \frac{\mathbf{x}-\mathbf{x}^3}{\sqrt{\mathbf{x}}} \mathbf{dx} = 8/21$

2°). (total 10%) Evaluate the derivative

$$\frac{\mathbf{d}}{\mathbf{dx}} \int_{-\mathbf{x}}^{3\mathbf{x}} \frac{\sin \mathbf{t}}{\sin \mathbf{t} + \cos \mathbf{t}} \mathbf{dt} = \frac{3 \sin 3x}{\sin 3x + \cos 3x} - \frac{\sin x}{\cos x - \sin x}$$

Answer

The definite integral of $\int_{0}^{pi/2} x*sin(x)\, dx$ is

1

The definite integral of $\int_{pi/6}^{pi/4} cos(x)**3/sin(x)\, dx$ is

$$-\frac{\log(2)}{2}-\frac{1}{8}+\frac{\log(4)}{2}$$

The definite integral of $\int_{0}^{0.5} cos(pi*x)**3\, dx$ is

$$\frac{2}{3\cdot\pi}$$

The definite integral of $\int_{0}^{4} sqrt(-x**2 + 16)\, dx$ is

$4\cdot\pi$

$$\begin{aligned}\int x\cos 2x dx &= \frac{x\sin 2x}{2}-\frac{\int \sin 2x dx}{2}\\ &= \frac{x\sin 2x}{2}+\frac{\cos 2x}{4}+C\end{aligned}$$

The definite integral of $\int_{0}^{1} exp(-x)*cos(x)\, dx$ is

$$-\frac{e^{-1}\cdot\cos(1)}{2}+\frac{e^{-1}\cdot\sin(1)}{2}+\frac{1}{2}$$

The definite integral of $\int_{0}^{pi/4} tan(x)*sec(x)**2\, dx$ is

1/2

The definite integral of $\int_{1}^{oo} sin(log(x))\, dx$ is

$$\int_{1}^{\infty} \sin(\log(x))\, dx$$

-2*sqrt(x) - x - 2*log(sqrt(x) - 1)

0.541680792225937

The definite integral of $\int_{0}^{0.5}$ sqrt(x)/(-sqrt(x) + 1) dx is

0.541680792225937

The definite integral of $\int_{0}^{\pi/4}$ sin(2*x)*sin(3*x) dx is

$$\frac{3\cdot\sqrt{2}}{10}$$

The definite integral of $\int_{0}^{1}$ (-x**3 + x)/sqrt(x) dx is

8/21

(-sin(x) - cos(x))/(2*(-sin(x) + cos(x))) - (-3*sin(3*x) + 3*cos(3*x)
)/(2*(sin(3*x) + cos(3*x))) + 2