Calculus, 2017-1-IE-2

Name: **Sequence Number:**

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

a°). $\int_0^{\pi/2}(\mathbf{x}\cos\mathbf{x})\mathbf{dx} = \frac{\pi}{2} - 1$

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

c°). $\int_0^1 \sin^4 \pi\mathbf{x}\mathbf{dx} = 3/8$

d°). $\int_0^4 \sqrt{\mathbf{4}+\mathbf{x^2}}\mathbf{dx} = 4\sqrt{5} + 2\ln\left|2+\sqrt{5}\right|$

e°). $\int_1^2 \mathbf{e^x}\sin\mathbf{3x}\mathbf{dx} = \frac{3e\cos 3 + e^2\sin 6 - e\sin 3 - 3e^2\cos 6}{10}$

f°). $\int_{\pi/4}^0 \tan^2\mathbf{x}\sec^2\mathbf{x}\mathbf{dx} = -1/3$

g°). $\int_1^\infty \cos(\ln\mathbf{x})\mathbf{dx} =$ fails to exist

h°). $\int_0^1 \frac{\sqrt{\mathbf{x}}\mathbf{dx}}{\sqrt{\mathbf{x}}+\mathbf{1}} = 2\ln 2 - 1$

i°). $\int_0^{\pi/3}\sin\mathbf{3x}\cos\mathbf{2x}\mathbf{dx} = 3/10$

j°). $\int_0^1 \frac{\mathbf{x^2}-\mathbf{1}}{\sqrt{\mathbf{x}}}\mathbf{dx} = -8/5$

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

$$\frac{\mathbf{d}}{\mathbf{dx}}\int_{\mathbf{2x}}^{\mathbf{x}}\frac{\mathbf{t}}{\mathbf{e^t}+\cos\mathbf{t}}\mathbf{dt} = \frac{x}{e^x+\cos x} - \frac{4x}{e^{2x}+\cos 2x}$$

Answer

```
                                pi/2
The definite integral of  ∫ x*cos(x) dx is
                                0
```

```
     π
-1 + ─
     2
```

```
                                pi/4
The definite integral of  ∫ sin(x)**3/cos(x) dx is
                                pi/6
  log(4)   1   log(2)   log(3)
- ──────── - ─ + ──────── + ──────
    2      8     2         2
```

```
                                1
The definite integral of  ∫ sin(pi*x)**4 dx is
                                0
```

```
3/8
```

```
                                4
The definite integral of  ∫ sqrt(x**2 + 4) dx is
                                0
```

```
2·asinh(2) + 4·√5
```

$$\int \sqrt{4+x^2}dx = \int 4\sec^3\theta d\theta \quad (x = 2\tan\theta)$$
$$= 2\left(\sec\theta\tan\theta + \ln(sec\theta + \tan\theta)\right)$$
$$= 2\left(\frac{\sqrt{4+x^2}}{2}\cdot\frac{x}{2} + \ln\left|\frac{\sqrt{4+x^2}}{2} + \frac{x}{2}\right|\right)$$
$$= 4\sqrt{5} + 2\ln\left|2+\sqrt{5}\right|$$

```
                                2
The definite integral of  ∫ exp(x)*sin(3*x) dx is
                                1
     2                            2
  3·e ·cos(6)   3·e·cos(3)    e ·sin(6)   e·sin(3)
- ─────────── + ─────────── + ────────── - ────────
       10            10           10         10
```

```
                                0
The definite integral of  ∫ tan(x)**2*sec(x)**2 dx is
                                pi/4
-1/3
```

$$\int_0^{\pi/2} \tan x/2dx = \int \frac{\sin x/2}{\cos x/2}dx = -2\ln\cos x/2|_0^{\pi/2} = \ln 2$$

The definite integral of $\int_1^{oo} \cos(\log(x))\,dx$ is

$$\int_1^{\infty} \cos(\log(x))\,dx$$

The definite integral of $\int_0^1 \mathrm{sqrt}(x)/(\mathrm{sqrt}(x) + 1)\,dx$ is

$$-1 + 2\cdot\log(2)$$

The definite integral of $\int_0^{pi/3} \sin(3*x)*\cos(2*x)\,dx$ is

$$3/10$$

The definite integral of $\int_0^1 (x**2 - 1)/\mathrm{sqrt}(x)\,dx$ is

$$-8/5$$

```
-4*x/(exp(2*x) + cos(2*x)) + x/(exp(x) + cos(x)) + Integral(0, (t, 2*
x, x))
```

$$\frac{\mathbf{d}}{\mathbf{dx}} \int_{\mathbf{2x}}^{\mathbf{x}} \frac{\mathbf{t}}{\exp \mathbf{t} + \sin \mathbf{t}} \mathbf{dt} = \frac{\mathbf{x}}{\exp \mathbf{x} + \sin \mathbf{x}} - \frac{\mathbf{4x}}{\exp(\mathbf{2x}) + \sin \mathbf{2x}}$$

```
Traceback (most recent call last):
  File "/Users/cch/anaconda36/anaconda/bin/jupyter-nbconvert", line 1
1, in <module>
    sys.exit(main())
  File "/Users/cch/anaconda36/anaconda/lib/python3.6/site-packages/ju
pyter_core/application.py", line 266, in launch_instance
    return super(JupyterApp, cls).launch_instance(argv=argv, **kwargs
)
  File "/Users/cch/anaconda36/anaconda/lib/python3.6/site-packages/tr
aitlets/config/application.py", line 658, in launch_instance
    app.start()
  File "/Users/cch/anaconda36/anaconda/lib/python3.6/site-packages/nb
convert/nbconvertapp.py", line 325, in start
    self.convert_notebooks()
  File "/Users/cch/anaconda36/anaconda/lib/python3.6/site-packages/nb
convert/nbconvertapp.py", line 482, in convert_notebooks
    cls = get_exporter(self.export_format)
  File "/Users/cch/anaconda36/anaconda/lib/python3.6/site-packages/nb
convert/exporters/base.py", line 110, in get_exporter
    % (name, ', '.join(get_export_names())))
ValueError: Unknown exporter "html", did you mean one of: html_ch, ht
ml_embed, html_toc, html_with_lenvs, html_with_toclenvs, latex_with_l
envs, selectLanguage?
```