

Worksheet 06~10

In [1]: `%config IPCompleter.greedy=True`

In [2]: `from sympy import *
from sympy.geometry.line import Line
from sympy.plotting import plot, plot3d
import matplotlib.pyplot as plt
%matplotlib inline

plt.rcParams['figure.figsize'] = 10, 10
init_printing(use_unicode=True)
x, y, a, b, r, h, sh = symbols('x y a b r h sh')`

6. If $f(x) = 3 \ln x$ and $g(x) = e^x$, then $g(f(x)) =$

- (A) $3x$
- (B) e^x
- (C) e^{2x}
- (D) x^3
- (E) $x^2 + 1$

Solution

My Work

$$(g(x) \circ f(x)) = g(f(x)) = e^{f(x)} = e^{3 \ln x} = e^{\ln x^3} = x^3$$

By SymPy

In [3]: `F = logcombine(3*ln(x), force=True)
F`

Out[3]: $\log(x^3)$

In [4]: `G = exp(x).subs(x, F)
G`

Out[4]: x^3

Answer: (D)

7. The slant height of a regular circular cone is 20 cm and the radius of the base is 10 cm. Find the volume of the cone?

(A) 1813.8cm^3

(B) 3000.5cm^3

(C) 4120.4cm^3

(D) 7024.8cm^3

(E) 7046.6cm^3

Solution

My Work

$$V(r, h) = \frac{1}{3}\pi r^2 h$$

$$h(r, sh) = \sqrt{sh^2 - r^2}$$

$$\begin{aligned} V(r, sh) &= \frac{1}{3}\pi r^2 \sqrt{sh^2 - r^2} \\ &= \frac{1}{3}\pi 10^2 \sqrt{20^2 - 10^2} \\ &= 1813.8 \end{aligned}$$

Using SymPy

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In [5]: V = Rational(1, 3)*pi*(r**2)*h
V
```

Out[5]: $\frac{\pi h r^2}{3}$

```
In [6]: V = V.subs(h, sqrt(sh**2-r**2))
V
```

Out[6]: $\frac{\pi r^2 \sqrt{-r^2 + sh^2}}{3}$

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In [7]: result = V.subs([(r, 10), (sh, 20)])
result
```

Out[7]: $\frac{1000\sqrt{3}\pi}{3}$

In [8]: `result.evalf(6)`

Out[8]: 1813.8

Answer: (A)

In []: