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Class:- B.Sc Physical Science With chemistry

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Assignment:- Maths Sec

Ques:-5.1(1)

$$f[x\_] := \frac{6x - 12}{x\hat{}2 - 4}$$

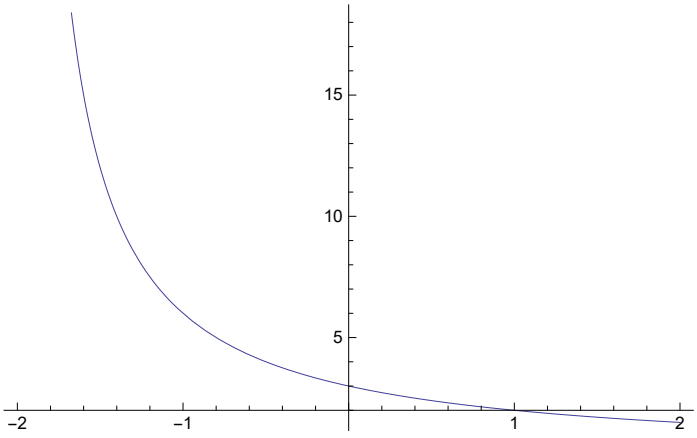
```
Limit[f[x], x → 2]
```

$$\frac{3}{2}$$

```
Limit[f[x], x → -2]
```

$$\infty$$

```
Plot[f[x], {x, -2, 2}]
```



Ques:-5.1(2)

$$f[x\_] := x \, \text{Sin}\left[\frac{b}{x}\right]$$

```
Limit[f[x], x → +∞]
```

b

```
ClearAll
```

```
ClearAll
```

Ques:-5.5(1)

```
D[f[x]/g[x], {x, 2}]
```

$$\frac{x\left(\frac{2\,b\,\text{Cos}\left[\frac{b}{x}\right]}{x^3}-\frac{b^2\,\text{Sin}\left[\frac{b}{x}\right]}{x^4}\right)}{g[x]}-\frac{2\,b\,\text{Cos}\left[\frac{b}{x}\right]\left(\frac{1}{g[x]}-\frac{x\,g'[x]}{g[x]^2}\right)}{x^2}+\text{Sin}\left[\frac{b}{x}\right]\left(-\frac{2\,g'[x]}{g[x]^2}+x\left(\frac{2\,g'[x]^2}{g[x]^3}-\frac{g''[x]}{g[x]^2}\right)\right)$$

```
ClearAll
```

```
ClearAll
```

Ques:-5.5(2)

```
f[x_] := Sec[x]
```

```
f'[x]
```

```
Sec[x] Tan[x]
```

```
f''[x]
```

```
Sec[x]^3 + Sec[x] Tan[x]^2
```

```
f'''[x]
```

```
5 Sec[x]^3 Tan[x] + Sec[x] Tan[x]^3
```

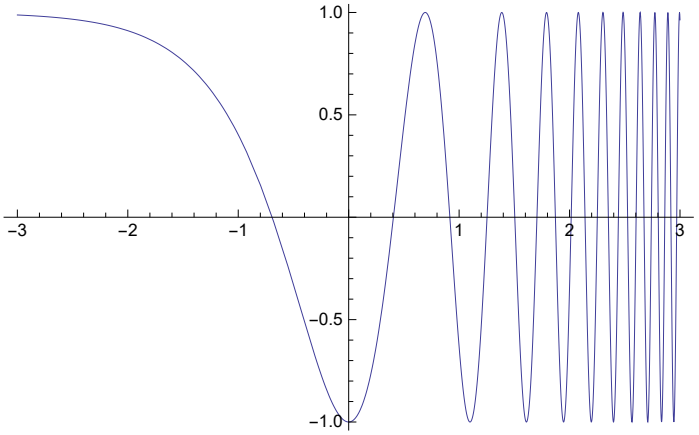
Ques:-5.6(1)

```
f[x_] := Cos[π e^x]
```

```
Maximize[{f[x], -3 ≤ x ≤ 3}, x]
```

```
{1, {x → Log[2]}}
```

```
Plot[f[x], {x, -3, 3}]
```



Ques:-5.6(2)

```
f[x_] := Sin[5 x]

Minimize[f[x], x]
```

$$\left\{-1, \left\{x \to \frac{3\pi}{10}\right\}\right\}$$

Ques:-5.6(4)

```
f[x_] := x^2/3

Minimize[f[x], x]
```

$$\{0, \{x \to 0\}\}$$

Ques:-5.10(1a)

```
Integrate[Sqrt[a^2 + u^2], u]
```

$$\frac{1}{2} u \sqrt{a^2 + u^2} + \frac{1}{2} a^2 \text{Log}\left[u + \sqrt{a^2 + u^2}\right]$$

b.

```
Integrate[Sqrt[a^2 - u^2], u]
```

$$\frac{1}{2}\left(u \sqrt{a^2 - u^2} + a^2 \text{ArcTan}\left[\frac{u}{\sqrt{a^2 - u^2}}\right]\right)$$

c.

```
Integrate[(a^2 + u^2)^3/2, u]
```

$$\frac{1}{2}\left(a^6\,u + a^4\,u^3 + \frac{3\,a^2\,u^5}{5} + \frac{u^7}{7}\right)$$

d.

```
Integrate[u Sqrt[2 a u - u^2], u]
```

$$\left(\sqrt{-u\,(-2\,a+u)}\;\left(\sqrt{u}\;\sqrt{-2\,a+u}\;\left(-3\,a^2 - a\,u + 2\,u^2\right) - 6\,a^3\,\text{Log}\left[\sqrt{u} + \sqrt{-2\,a+u}\right]\right)\right) \Big/ \left(6\sqrt{u}\;\sqrt{-2\,a+u}\right)$$

e.

```
Integrate[Sec[u], u]
```

$$-\text{Log}\left[\text{Cos}\left[\frac{u}{2}\right] - \text{Sin}\left[\frac{u}{2}\right]\right] + \text{Log}\left[\text{Cos}\left[\frac{u}{2}\right] + \text{Sin}\left[\frac{u}{2}\right]\right]$$

Ques:-5.10(3)

```
ClearAll
```

```
ClearAll
```

```
Integrate[Log[x], x]
```

$$-x + x\,\text{Log}[x]$$

```
Integrate[(Log[x])^2, x]
```

$$2\,x - 2\,x\,\text{Log}[x] + x\,\text{Log}[x]^2$$

```
Integrate[(Log[x])^3, x]
```

$$-6\,x + 6\,x\,\text{Log}[x] - 3\,x\,\text{Log}[x]^2 + x\,\text{Log}[x]^3$$

```
Integrate[(Log[x])^4, x]
```

$$24\,x - 24\,x\,\text{Log}[x] + 12\,x\,\text{Log}[x]^2 - 4\,x\,\text{Log}[x]^3 + x\,\text{Log}[x]^4$$

```
∫(Log[x])^n dx
```

$$\text{Gamma}[1+n, -\text{Log}[x]]\;(-\text{Log}[x])^{-n}\,\text{Log}[x]^n$$

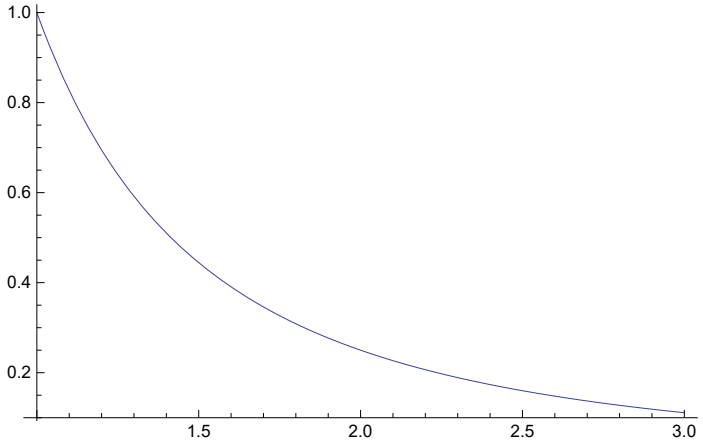
Ques:-5.11(1)

```
f[x_] := 1/x^2
```

$$\int_1^3 f[x]\, dx$$

$$\frac{2}{3}$$

```
Plot[f[x], {x, 1, 3}]
```



Ques:-5.11(2)

$$\int_0^1 \sqrt{t^4 + 2t^2 + 1}\, dt$$

$$\frac{4}{3}$$

$$\int_0^1 \sqrt{t^4 + 2t^2 + 2}\, dt$$

$$\frac{1}{3}\left(\sqrt{5}\ - 2\sqrt{-1+i}\ \text{EllipticE}\left[i\ \text{ArcSinh}\left[\sqrt{\frac{1}{2}-\frac{i}{2}}\ \right], i\right] + 2\sqrt{1-i}\ \text{EllipticF}\left[i\ \text{ArcSinh}\left[\sqrt{\frac{1}{2}-\frac{i}{2}}\ \right], i\right]\right)$$

$$\int_0^\pi \text{Cos}\,(t)^{10}\, dt$$

$$\frac{\text{Cos}\,\pi^{11}}{11}$$

```
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