

Lab 1
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Section 32
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Problem 1: Define the Function $f(x)$.

```
In[1]:= f[x_] = (1 - Tan[x]) / (Sin[x] - Cos[x])  
Out[1]= 
$$\frac{1 - \tan(x)}{\sin(x) - \cos(x)}$$

```

```
In[2]:= Limit[f[x], x -> (Pi / 4)]  
Out[2]= -\sqrt{2}
```

Problem 2: Compute The fourth Derivative of $f(x)$ with respect to x . Compute the integral of $f(x)$ on $[2,4]$.

Problem 2: Part 1

```
In[5]:= Quit[]  
  
In[5]:= f[x_] = Cos[x - 1] + Log[x - 1] + x * Exp[x^2 + 1]  
Out[5]= 
$$e^{1+x^2} x + \cos(1-x) + \log(-1+x)$$
  
  
In[9]:= D[f[x], {x, 4}]  
Out[9]= 
$$-\frac{6}{(-1+x)^4} + 4 \left(12 e^{1+x^2} x + 8 e^{1+x^2} x^3\right) + x \left(12 e^{1+x^2} + 48 e^{1+x^2} x^2 + 16 e^{1+x^2} x^4\right) + \cos(1-x)$$

```

Below Work was done to check for correctness.

```
In[11]:= g[x_] = D[f[x], {x, 4}]  
Out[11]= 
$$-\frac{6}{(-1+x)^4} + 4 \left(12 e^{1+x^2} x + 8 e^{1+x^2} x^3\right) + x \left(12 e^{1+x^2} + 48 e^{1+x^2} x^2 + 16 e^{1+x^2} x^4\right) + \cos(1-x)  
  
In[12]:= z[x_] = g[x] /. {x -> 2} // N  
Out[12]= 188.776.$$

```

Problem 2: Part 2

```
In[7]:= Integrate[f[x], {x, 2, 4}] // N  
Out[7]= 
$$1.20774 \times 10^7$$

```

```
In[10]:= Integrate[f[x], {x, 2, 4}]  
Out[10]= -2 +  $\frac{1}{2} e^5 (-1 + e^{12}) + \text{Log}[27] - \text{Sin}[1] + \text{Sin}[3]$ 
```

```
In[19]:= Quit[]
```

```
In[16]:= ? Log
```

Log[z] gives the natural logarithm of z (logarithm to base e).
Log[b, z] gives the logarithm to base b . >>