Problem Set 4-Wednesday

Please indicate the members who are present. Also indicate the group coordinator.

Group Number:	
Members:	

Problem 1

Find the integral

$$\int_0^{\frac{4}{\pi}} \frac{1+\sin\theta}{\cos^2\theta}\,d\theta$$

$$= \int_0^{\frac{\pi}{4}} \left[\frac{1}{\cos^2\theta} + \frac{\sin\theta}{\cos^2\theta}\right] d\theta$$

$$= \int_0^{\frac{\pi}{4}} (\sec^2\theta + \tan\theta\sec\theta)\,d\theta$$

$$= (\tan\theta + \sec\theta)\Big|_0^{\frac{\pi}{4}}$$

$$= (1+\sqrt{2}) - (0+1) = \sqrt{2}$$

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using Plots, SymPy, LaTeXStrings
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x, θ = symbols("x, θ", real=true)
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# problem 1
f1(θ)= (1+sin(θ))/(cos(θ))^2
I1 = integrate(f1(θ),(θ,0,π/4))
```

1.41421356237309

Problem 2

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# problem 2
f2(x) = x*(x^(1//3)+x^(1//4))
f2(x)
I2 = integrate(f2(x),(x,0,1))
```

$\frac{55}{63}$

Find the integral

$$\int_0^1 x\left(\sqrt[3]{x}+\sqrt[4]{x}\right)dx$$

$$= \int_0^1 x\left(x^{\frac{1}{3}}+x^{\frac{1}{4}}\right)dx$$

$$= \int_0^1 \left(x^{\frac{4}{3}}+x^{\frac{5}{4}}\right)dx = \left[\frac{3x^{\frac{7}{3}}}{7}+\frac{4x^{\frac{9}{4}}}{9}\right]_0^1$$

$$= \frac{3}{7}+\frac{4}{9} = \frac{27+28}{63} = \frac{55}{63}$$

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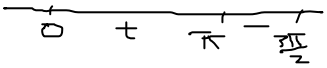
# problem 3
I3 = integrate(abs(sin(x)),(x,0,3π/2))
```

3.0

Problem 3

Find the integral

$$\int_0^{3\pi/2} |\sin x|\, dx$$



$$= \int_0^{\pi} \sin x\, dx - \int_{\pi}^{3\pi/2} \sin x\, dx$$

$$= -\cos x \Big|_0^{\pi} + \cos x \Big|_{\pi}^{3\pi/2}$$

$$= -(-1-1) + (0+1)$$

$$= 2+1 = 3$$

Problem 4

```
# problem 4
displacement = integrate(x^2-5*x+4,(x,0,4))
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$-\frac{8}{3}$

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distance = integrate(abs(x^2-5*x+4),(x,0,4))
```

$\frac{19}{3}$

If a particle is moving along a straight line and its velocity is given by

$$v(t) = t^2 - 5t + 4, \quad 0 \le t \le 4.$$

Find its displacement and distance it travels on the time interval $[0, 4]$ are: