MATH 122: Calculus II

Hints and Answers ffor Assignment 17

I: Section 7.3: 27, 28

Exercise 27: We have $dy/dx = \frac{\sqrt{x^2-16}}{x}$ so $y = \int \frac{\sqrt{x^2-16}}{x}\, dx$. This is essentially the same integration problem as Example 3 in Section 7.3 of the text with 4^2 replacing 3^2 and can be solved the same way. $C = 0$

Exercise 28: Here $\frac{dy}{dx} = \frac{x^3}{\sqrt{1-x^2}}$ with $y(0) = 0$. Thus $y = \int \frac{x^3}{\sqrt{1-x^2}} : dx$. Let $\sin\theta = x$. $C = 2/3$.

II: Section 7.4: 10, 20

Exercise 10: Factor denominator: $x^3 - 4x^2 - 5x = x(x^2 - 4x - 5) = x(x-5)(x+1)$. Thus

$$\frac{4x^2 - 5x - 15}{x^3 - 4x^2 - 5x} = \frac{A}{x} + \frac{B}{x-5} + \frac{C}{x+1}$$

$A = 3, B = 2, C = -1$ The integral equals $3\ln|x| + 2\ln|x-5| - \ln|x+1| + K$.

Exercise 20: Let $u = x^2 + 1$

III: Section 7.7: 1, 9, 18

Exercise 1:

$$\int_1^{\infty} \frac{1}{x^{4/3}}\, dx = \lim_{b\to\infty} \int_1^b x^{-4/3}\, dx = 3$$

Exercise 9:

$$\int_{-\infty}^{-1} \frac{1}{x^3}\, dx = \lim_{a\to-\infty} \int_a^{-1} \frac{1}{x^3}\, dx = -\frac{1}{2}$$

Exercise 18: Use Partial Fraction Decomposition. Answer is $\frac{1}{2}\ln 2 \approx 0.347$