Homework 15 4/24: MATH 112 Prof. Maxwell Auerbach

Show all work. No credit will be given for answers without sufficient work. No calculators are allowed. Collaboration with classmates is allowed, but all work submitted must be written out and explained by you.

1 Homework 15 Problems: Review

1.1 (7.1.4) Find $\int ye^{y/5}\,dy$

1.2 (7.2.3) Find $\int_0^{\pi/2} \sin^7(\theta)\cos^5(\theta)\,d\theta$

1.3 (11.2.22) Determine whether the following series is convergent and if it is find its sum.

$$\sum_{n=1}^{\infty} \frac{5}{\pi^n}$$

1.4 (11.3.10) Determine whether the following series is convergent.

$$\sum_{n=1}^{\infty} n^{-0.9999}$$

1.5 (11.6.16) Determine whether the following series is convergent.

$$\sum_{n=1}^{\infty} \frac{n^{10}}{(-10)^{n+1}}$$

1.6 (11.10.36) Use a known Maclaurin series to find a Maclaurin series for the function $f(x) = \sin(\pi x/4)$

1.7 (9.3.16) Solve the following initial value problem.

$$\frac{dP}{dt} = \sqrt{Pt} \quad P(1) = 2$$

1.8 (9.5.6) Solve the following differential equation

$$y' - y = e^x$$

Extra Problems 4/24: MATH 112 Prof. Maxwell Auerbach

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2 Extra Problems: Review

2.1 (7.5.10) Find $\int \frac{\cos(1/x)}{x^3}\,dx$

2.2 (7.2.28) Find $\int \tan^5(x)\sec^3(x)\,dx$

2.3 (11.7.) Determine whether the following series is convergent and if it is find its sum.

$$\frac{1}{3}+\frac{2}{9}+\frac{1}{27}+\frac{2}{81}+\frac{1}{243}+\frac{2}{729}+\cdots$$

2.4 (11.3.10) Determine whether the following series is convergent.

$$1+\frac{1}{8}+\frac{1}{27}+\frac{1}{64}+\frac{1}{125}+\cdots$$

2.5 (11.6.16) Determine whether the following series is convergent.

$$\sum_{n=1}^{\infty}\frac{1\cdot 3\cdot 5\cdot\cdots\cdot(2n-1)}{2\cdot 5\cdot 8\cdot\cdots\cdot(3n-1)}$$

2.6 (11.10.38) Use a known Maclaurin series to find a Maclaurin series for the function $f(x)=e^{3x}-e^{2x}$

2.7 (9.R.7) Solve the following initial value problem.

$$2ye^{y^2}y' = 2x+3\sqrt{x}$$

2.8 (9.R.5) Solve the following differential equation

$$y' = xe^{-\sin(x)} - y\cos(x)$$