

# MAT 132-Sample Final Exam-Spring 2019

NAME:

\*There are 10 questions worth 10 points each!

1. Find all antiderivatives of  $\sin(x^3)$  using Maclaurin series.

2. Find the interval and radius of convergence:

$$\sum_{n=1}^{\infty} \frac{(-2)^n x^n}{\sqrt[4]{n}}$$

3. Compute:  $\int \frac{2x^2-2x-1}{x^3-x^2} dx$

4. Compute  $\int x^2 e^{2x} dx$

5. Write a third degree Taylor Polynomial for  $\sqrt{x}$  centered at  $x = 9$ .

6. Write an infinite geometric series in sigma notation with sum 5 and first term 4 or show that this is not possible.

7. Find the sum of  $\sum_{n=1}^{\infty} \frac{1}{4n^2 - 12n + 5}$

8. Show that  $\sum_{n=1}^{\infty} \frac{\text{Arc tan } n}{1+n^2}$  converges.



9. Compute  $\int \frac{1}{x^2-8x+20} dx$

10. A full cylindrical tank has a depth of 9 feet. After draining for 30 minutes, the tank has a depth of 4 feet. How long does it take to empty if the rate at which the depth of the liquid drops is directly proportional to the square root of the depth of the liquid? Derive any formula you use by solving a differential equation.