Final Practice

1) Find $\int_0^{\frac{\pi}{4}} e^{\cos^2(x)} \sin(x)\cos(x)\,dx$

2) $\frac{d}{dx}\int_{x^2}^{\ln(x)} (4t + e^t)dt$

3) The velocity of a bullet from a rifle can be approximated by $v(t) = 6400t\,2 - 6505t + 2686$, where t is seconds after the shot and v is the velocity measured in feet per second. This equation only models the velocity for the first half-second after the shot: $0 \le t \le 0.5$. What is the total distance the bullet travels in 0.5 sec?

4) Find the area bounded by $y = x^2$ and $y = \sqrt{x}$. Also find the volume of the solid rotated along the x-axis.

5) Find the length of arc of y for $x = 3 - \sqrt{y}$ from $y = 0$ to $y = 4$.

6) $\int e^x \sin x\,dx$

7) $\int \sin^2(x)\cos^2(x)\,dx$

8) $\int_1^4 \frac{\ln\left(\frac{1}{x}\right)}{x} dx$

9) Approximate the integral $\int_1^2 \sqrt{x^5 + 2}dx$ using Simpson's Rule using for subintervals.

10) Suppose a rock falls from rest from a height of 100 meters and the only force acting on it is gravity. Find an equation for the velocity v(t) as a function of time, measured in meters per second.

11) Solve $y' = y(x^2 + 1)$

12) Solve $xy' = y(x - 2), with\ initial\ value\ \ y(1) = 3$

13) Solve the first order ODE $y' = x\ln(x)\,y + 3x$

14) Solve the first order ODE $xy' = \frac{2\cos x}{x} - 3y$

15) Determine $\lim_{n\to\infty} n^{-\frac{1}{n}}$

16) Determine $\sum_{n=0}^{\infty}(1-(-1)^n)$

17) Determine $\sum_{n=1}^{\infty} \ln\left(\frac{n}{n+1}\right)$

18) Determine $\sum_{n=0}^{\infty} n^{-\left(n+\frac{1}{n}\right)}$

19) Determine $\sum_{n=0}^{\infty} \frac{(-1)^n n!}{n^n}$

20) Determine $\sum_{n=0}^{\infty} \frac{2^{n+4}}{7^n}$

21) Find Maclaurin Series of $f(x) = \cos(3x)$ and determine the interval of convergence

22) Find the interval of convergence of $\sum_{n=0}^{\infty} \frac{3nx^n}{12^n}$.

23) Change the parametric equation to $y = f(x)$. $x(t) = 5\cos(t),\ y(t) = \sqrt{11}\sin t$

24) Find all points on the curve $x = t + \frac{1}{t}$ and $y = t - \frac{1}{t}$ that have slope=1.

25) Find $\frac{d^2y}{dx^2}$ of $x = \frac{1}{2}t^2,\ y = \frac{1}{3}t^3$

26) Find the rectangular coordinates of $r = 4\sin(\theta)$

27) Find the equation of the tangent line $r = 3 + \cos(2\theta)$ at $\theta = \frac{3\pi}{4}$.