1. Integrate the following

a) $\int 5x^2 \, lnx \;\; dx$

b) $\int \frac{5x^2+6x+1}{2x^3+x^2} \, dx$

c) $\int tan^3(5x)\, sec^3(5x)\ \ dx$

d) $\int \frac{\sqrt{x^2-25}}{x}$ dx

e) $\int sin^2\left(\frac{x}{4}\right) cos^2\left(\frac{x}{4}\right)\ dx$

f) $\int_0^1 x^2 e^{-x^3}\ dx$

2. Find each limit if it exists.

a) $\lim_{x \to 0} \frac{e^{2x} - 3e^{x} + x + 2}{e^{4x} - 4x - 1}$

b) $\lim_{x \to 0^{+}} (\sin(3x))^{\frac{2}{\ln(4x)}}$

3. Evaluate each improper integral if it converges, otherwise clearly state that it diverges.

a) $\int_4^{\infty} \frac{1}{16+x^2}\, dx$

b) $\int_1^{2} \frac{7}{\sqrt[4]{x-1}}\, dx$

4. State whether the following converge conditionally, converge absolutely or diverge. Show all work and state the names of all tests used.

a) $\sum_{k=2}^{\infty} \frac{7k}{(k+2)\ln(k)}$

b) $\sum_{k=1}^{\infty} \frac{(-1)^k (3k)}{3k^2-1}$

c) $\sum_{n=1}^{\infty} \frac{(-2)^n \, 3n!}{(3n)!}$

d) $\sum_{n=1}^{\infty} \frac{(3n-1)^n}{(2n+1)^{2n}}$

5. Find the interval and radius of convergence for the given power series. Be sure to check the endpoints.

$$\sum_{n=1}^{\infty} \frac{(-5)^n(3x+12)^n}{\sqrt{3n+1}}$$

6. Determine the McLaurin series for the following. Give your answer in summation notation.

a) $f(x) = -2x^2(\cos(4x^3))$

b) $g(x) = \frac{e^{x^2}}{4x^7}$

7. Find the Taylor polynomial of order four for $F(x) = 2\cos(3x)$ where $a = -\pi/12$.

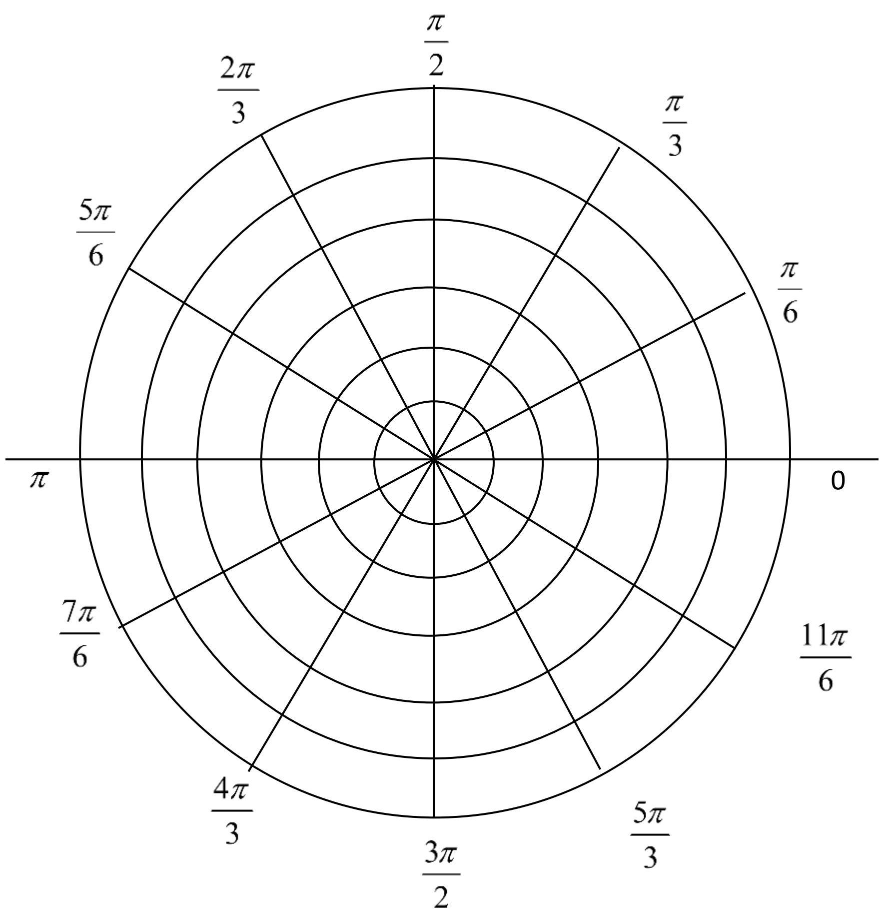
8. Evaluate the following integral to the nearest ten-thousandth. Use the appropriate number of terms in your evaluation.

$$\int_0^{0.19} e^{-2x^2}\,dx$$

9. Find the equation of the line which is tangent to the given parametric equation where t = 2. Give your answer in slope –intercept form.

X(t) = e^{3t-6}+ 2t +1   Y(t) = $e^{t-2} + t^2 - 3$

10. a. Graph the polar equation $r = -4\cos(2\theta)$.



b. Find the area enclosed in this curve.

c. SET UP ONLY the integral which represents the arc length of this curve.

11. Find the length of the parametric curve from t =0 to t =2 for

$X(t) = 8t + 13$ and $Y(t) = 2e^{2t} + 2e^{-2t} + 5$

12. Eliminate the parameter and sketch the parametric equation given. Be sure to indicate the direction of travel.

$$X(t) = -2 + 3\sin t \qquad Y(t) = 2\cos t + 1 \quad \text{where } 0 \le t \le 2\pi .$$