MATH 2320 Test 3 Practice

Name:_____

No calculators, no phones, no electronics allowed.

1. $\displaystyle\int \frac{x^2}{(4-x^2)^{3/2}}\,dx$

2. $\displaystyle\int \frac{4x^2 - x - 6}{x^3 - 3x^2}\, dx$

3. Compute the following limits

(a) $\lim_{n\to\infty} \left(1 + \frac{4}{n^2}\right)^{n^2}$

(b) $\lim_{n\to\infty} \frac{n!}{(n+1)!}$

(c) $\lim_{n\to\infty} \frac{(n+1)!}{n!} \frac{n^n}{(n+1)^{n+1}}$

4. State whether or not the following series converge or diverge, what test you used, what criteria was satisfied and show your work.

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

(b) $4 - \frac{2}{3} + \frac{1}{9} - \frac{1}{54} + \cdots$

(c) $\displaystyle\sum_{n=1}^{\infty}\left(1-\frac{2}{n}\right)^{n}$

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

(e) $\displaystyle\sum_{n=1}^{\infty} \frac{2^n}{n^2}$

(f) $\displaystyle\sum_{n=1}^{\infty} \left(1 - \frac{2}{n}\right)^{n^2}$

5. Find the interval of convergence for the the following power series.

$$\sum_{n=1}^{\infty} \frac{3^n}{n^2} x^n$$

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

6. Find the Taylor series for the given functions. Show your work and the n^{th} term. Use the definition.

$$f(x) = \ln(1 + x) \text{ centered at } x = 1.$$

7. Find the Taylor series for the given functions. Show your work and the n^{th} term. Use the a known series. You are expected to know the Taylor series for e^x, $\sin(x)$, $\cos(x)$, and $\frac{1}{1-x}$.

$$f(x) = \arctan(x) \text{ centered at } x = 0.$$