Calculus III, MAT 2213.002 Exam, Oct. 18, 1993. Instructor: D. Gokhman
Show all pertinent work, answers alone are not sufficient. Box the answers.
Name: $\qquad$

1. ( 30 pts .) Find the interval of convergence for the following power series:

$$
\text { (a) } \sum_{n=1}^{\infty} \frac{(x+2)^{n}}{\sqrt{n}} \quad \text { (b) } \sum_{n=0}^{\infty} \frac{(-3)^{n+1}(x-5)^{n}}{2^{3 n}}
$$

2. (30 pts.) Determine whether each of the following sequences or series converges to a real number.
(a) $\frac{\sqrt{n} \ln (n)}{n}$
(b) $\sum_{n=1}^{\infty} \frac{(2 n)!}{(3 n)!}$
(c) $\sum_{n=1}^{\infty} \frac{n^{\frac{1}{2}} \cos (n \pi)}{\left(n^{5}+1\right)^{\frac{1}{4}}}$
3. (20 pts.) Find the Taylor polynomial for $\sqrt[5]{x}$ of degree $n=2$ centered at $a=32$. Estimate the error of approximating $\sqrt[5]{30}$ with the above polynomial.
4. (20 pts.) For each of the following functions $f(x)$ find the Taylor series with center $a=0$.

$$
\begin{array}{ll}
\text { (a) } f(x)=\frac{x^{10}}{5-x^{2}} & \text { (b) } f(x)=\frac{x}{(1+x)^{2}}
\end{array}
$$

| 1 | 2 | 3 | 4 | total (100) |
| :--- | :--- | :--- | :--- | :--- |
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