Calculus II. Review for Test 2.

1. Find these definite integrals and classify as "divergent" or "convergent":

a) $\displaystyle\int_3^\infty xe^{(-x^2)}dx$ *b)* $\displaystyle\int_{-1}^0 \frac{3}{x^5}dx$ *c)* $\displaystyle\int_{-2}^{14} \frac{1}{\sqrt[4]{x+2}}dx$

2. For each of these sequences, find the limits, if they exist, and decide "diverges" or "converges."

a) $\displaystyle\lim_{n\to\infty} \frac{2^n+n}{3^n+1}$ *b)* $\displaystyle\lim_{n\to\infty} \frac{n+4n^3}{2n^4+1}$

c) $\displaystyle\lim_{n\to\infty} \frac{n^3+n^2}{7n^3+1}$ *d)* $\displaystyle\lim_{n\to\infty} \frac{7}{\cos(n\pi)}$

e) $\displaystyle\lim_{n\to\infty} \frac{\tan^{-1}(n)}{3}$ *f)* $\displaystyle\lim_{n\to\infty} \frac{(-1)^n}{3^n}$

g) $\displaystyle\lim_{n\to\infty} \frac{3^n(-1)^n}{2^n}$

3. For each series, what does the limit test for divergence tell us? [converge, diverge, or inconclusive] Show your work by performing the test.

$a) \sum_{n=1}^{\infty} \frac{e^{2n}+3n}{5e^{2n}-6}$ $b) \sum_{n=1}^{\infty} \frac{2^n}{3^n}$ $c) \sum_{n=1}^{\infty} \frac{3}{e^{2n}}$

4. For each series, what does the geometric series test tell us? [not applicable, converge, diverge, or inconclusive] Show your work, and find the value if it converges.

$a) \sum_{n=1}^{\infty} \frac{3^n}{\pi^n}$ $b) \sum_{n=1}^{\infty} \frac{5^n}{(\sqrt{3})^n}$ $c) \sum_{n=1}^{\infty} \frac{3}{(0.5)^n}$

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

5. For each series, what does the p-series test tell us? [not applicable, converge, diverge, or inconclusive] Show your work.

$a) \sum_{n=1}^{\infty} \frac{5^n}{(\sqrt{3})^n}$ $b) \sum_{n=1}^{\infty} \frac{3}{n^{(0.5)}}$ $c) \sum_{n=1}^{\infty} \frac{2}{n}$ $d) \sum_{n=1}^{\infty} \left(\frac{1}{n}\right)^3$

6. For each series, what does the integral test tell us? [not applicable, converge, diverge, or inconclusive] Show your work.

$a) \sum_{n=1}^{\infty} \frac{\sqrt{n}+4}{n^2}$ $b) \sum_{n=1}^{\infty} \frac{1}{\sqrt{n+1}}$ $c) \sum_{n=1}^{\infty} \left(\frac{1}{n}\right)^3$

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

7. For each series, what does the comparison test tell us? [not applicable, converge, or diverge] Show your work.

$a) \sum_{n=1}^{\infty} \frac{1}{2n^3+1}$ $b) \sum_{n=1}^{\infty} \frac{9^n}{3+10^n}$ $c) \sum_{n=1}^{\infty} \frac{6^n}{-4+5^n}$

$d) \sum_{n=1}^{\infty} \frac{(-1)^n}{-4+5^n}$

8. For each series, what does the limit comparison test tell us? [not applicable, converge, or diverge] Show your work.

$(a) \sum_{n=1}^{\infty} \frac{1}{2n+1}$ $b) \sum_{n=1}^{\infty} \frac{n+2}{(n+1)^3}$ $c) \sum_{n=1}^{\infty} \frac{2^n}{5^n-n}$

9. For each series, use the alternating series test or the limit test for divergence to decide: [converge, or diverge]. Show your work.

$a) \sum_{n=1}^{\infty} \frac{(-1)^n}{\ln(n+1)}$ $\qquad b) \sum_{n=1}^{\infty} \frac{(-1)^n}{4n+1}$ $\qquad c) \sum_{n=1}^{\infty} \frac{(-1)^n}{e^{-n}}$

10. Decide if the sums converge or diverge, explain why. If there is a formula for the sum, find the value.

$a) \sum_{n=1}^{\infty} n^2 e^{-n^3}$ $\qquad b) \sum_{n=1}^{\infty} e^{2n}$ $\qquad c) \sum_{n=1}^{\infty} \frac{2^n}{e^{3n}}$

11. For each series, what does the ratio test tell us? [converge absolutely, diverge, or inconclusive]. Show your work by finding the limit.

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

(b) $\sum_{n=1}^{\infty} \frac{2^{(n^2)}}{(2n)!}$

12. For each series, what does the root test tell us? [converge absolutely, diverge, or inconclusive]. Show your work by finding the limit.

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

(b) $\sum_{n=1}^{\infty} \left(\frac{1}{\sqrt{n}}\right)^n$

13. For this power series, determine the radius of convergence.

$$\sum_{n=1}^{\infty} \frac{2(x-3)^n}{n5^n}$$

14. For this power series, the radius of convergence is found to be $R = 3$. Determine the interval of convergence.

$$\sum_{n=1}^{\infty} \frac{(x-2)^n}{n3^{(n+1)}}$$

15. For this power series, determine the interval of convergence.

$$\sum_{n=1}^{\infty} \frac{5^n x^n}{1+2^n}$$

16. Also study the quizzes, and the homework questions. These are good test questions too!