MATH2132 Test1 **February 1, 2011** **60 minutes**

Values

Answers

2 1. The limit of the sequence $\left\{\frac{(-1)^n n^2+3n}{2n^2+5}\right\}$ is

(a) 1/2 (b) $\pm 1/2$ (c) ∞ (d) $-\infty$ (e) None of these

ans. e

2 2. The limit of the sequence $\left\{\frac{2n^2+3}{5-3n^2}\mathrm{Sin}^{-1}\left(\frac{n+2}{2n-3}\right)\right\}$ is

(a) -1 (b) $\pi/10$ (c) $-\pi/9$ (d) $\pi/6$ (e) None of these

ans. c

2 3. The sum of the series $\sum_{n=1}^{\infty}\left(-\frac{3}{4}\right)^{n+1}$ is

(a) 9/28 (b) 9/4 (c) $-3/7$ (d) -3 (e) None of these

ans. a

2 4. The sum of the series $\sum_{n=1}^{\infty} n\left(\frac{7}{4}\right)^n$ is

(a) $-7/3$ (b) 7/3 (c) ∞ (d) $-\infty$ (e) None of these

ans. c

2 5. The limit of the sequence of functions $\left\{\left(1+\frac{x}{2n}\right)^n\right\}$ on the interval $0 \le x < 1$ is

(a) 1 (b) $e^{x/2}$ (c) $x/2$ (d) Does not exist (e) None of these

ans. b

10 6. Prove that the Maclaurin series for e^{3x} converges to e^{3x} for all x.

hint: $R_n(0,x) = 3^{n+1} e^{3z_n} \frac{x^{n+1}}{(n+1)!}$

8 7. What is the interval of convergence for the power series

$$\sum_{n=1}^{\infty} \frac{n+1}{n4^n} x^n ?$$

Justify all results.

ans. $-4 < x < 4$

12 8. Find the Taylor series about $x = 4$ for the function

$$f(x) = \frac{1}{(x-2)^2}.$$

Express your answer in sigma notation simplified as much as possible. You must use a technique that guarantees that the Taylor series converges to the function. What is the radius of convergence of the series?

ans. $\sum_{n=0}^{\infty} \frac{(-1)^n (n+1)}{2^{n+2}} (x-4)^n$

$R = 2$