123. Summer Exam, 2001.

Long Questions

1. Rewrite
$$\frac{1}{(x-1)(x+3)(x+2)}$$
in the form
$$\frac{A}{x-1}+\frac{B}{x+3}+\frac{C}{x+2}$$

2. Sketch the graph of
$$y=\frac{2}{x^2-5x-14}$$
showing clearly any asymptotes.

3. Write down the first three non-zero terms of the Taylor expansion of $x\cos x$.

Short Questions

1. What are the solutions to $6x^2+x-2=0$?

A. $x=\frac{1}{2}$, $x=-\frac{2}{3}$ B. $x=-\frac{1}{2}$, $x=-\frac{2}{3}$ C. $x=\frac{1}{3}$, $x=-1$
D. $x=-\frac{1}{3}$, $x=1$ E. $x=-2$, $x=3$

2. In the New York Lotto there are 51 balls and six are drawn. A set of six numbers costs 50 cents, but the minimum you can play is two sets of numbers for a dollar. If you have two (different) sets of numbers you chance of winning the match six prize is one in

A. 5 B. 6483405600 C. 9004730 D. 391510 E. 15002320

3. 72° in radians is

A. 2π B. π C. $2\pi/3$ D. $\pi/2$ E. $2\pi/5$

4. What is the period of $2\sin 3x\cos 3x$

A. π B. $\pi/2$ C. $\pi/3$ D. $\pi/4$ E. $\pi/5$

5 What is
$$\lim_{x\to\infty} \frac{3x^2 - 2x + 6}{9x^2 - 2x + 5}$$

A. $-\infty$ B. ∞ C. 1 D. $\frac{1}{3}$ E. $\frac{6}{5}$

6. A population halves every five hours, if you begin with a population of 1000, after 24 hours the population will be approximately

A. 1155 B. 27858 C. 36 D. 12 E. 866

7. What is the mimimum value of $x^2 - 4x + 4$

A. -2 B. -1 C. 0 D. 1 E. 2

8. For $f(x) = \log_e(1 + x^3)^3$, what is $f'(1)$

A. $\frac{9}{2}$ B. -3 C. $3\log_e 2$ D. $9\log_e 2$ E. 9

9 What is
$$\lim_{x\to 0} \frac{x^2}{\sin x^2}$$

A. $-\infty$ B. -1 C. 0 D. 1 E. ∞