

Math 1M03 Test #1 (Version 1)
July 9th, 2015

Name: _____
(Last Name) (First Name)

Student Number: _____

This test consists of 15 multiple choice questions worth 1 mark each (no part marks), and 1 question worth 1 mark (no part marks) on proper computer card filling. All questions must be answered on the COMPUTER CARD with an HB PENCIL. Marks will not be deducted for wrong answers (i.e., there is no penalty for guessing). You are responsible for ensuring that your copy of the test is complete. Bring any discrepancy to the attention of the invigilator. Only the McMaster standard calculator Casio fx-991 is allowed.

1. Evaluate the following integral:

$$\int \frac{(x-1)^2}{x} dx$$

- (a) $x^2 + 2 \ln|x| - \frac{1}{x} + C$ (b) $x^2 - \frac{1}{x} + C$ (c) $\frac{1}{2}x^2 + \ln(2x) - \frac{1}{x} + C$
(d) $\frac{1}{2}x^2 - 2x + \ln|x| + C$ (e) $\frac{1}{2}x^2 - \ln(2x) + \frac{1}{x} + C$

2. If $f'(x) = 6x^2 + 10x + 1$ and $f(1) = 3$, find $f(-2)$.

- (a) -3 (b) -2 (c) -5 (d) -4 (e) -6

3. Evaluate the following integral:

$$\int \left(\frac{2}{x^3} + \frac{2}{x} - \sqrt{\frac{1}{x} + e} \right) dx$$

- (a) $\frac{2}{x^2} + \ln(x^2) - \sqrt{x} + e^x + C$ (b) $-\frac{2}{x^2} + \frac{\ln|x|}{x} - 2\sqrt{x} + ex + C$ (c) $-\frac{1}{x^2} + 2 \ln|x| - 2\sqrt{x} + ex + C$
(d) $-x^{-2} + 2 \ln|x| - 2\sqrt{x} + e^x + C$ (e) $\frac{1}{x^2} + 2 \ln|x| - \sqrt{x} + e^x + C$

4. If \$11,520 is invested at 6% per year, compounded continuously, what is the accumulated amount after 5 years?

- (a) \$8,608.41 (b) \$14,976.00 (c) \$15,550.37 (d) \$15,416.36 (e) \$15,437.90

5. How much money should be invested now at 3% to obtain \$18,000 in 6 years if interest is compounded quarterly?

- (a) \$15,044.97 (b) \$15,034.86 (c) \$15,126.41 (d) \$15,011.68 (e) \$14,998.21

6. Expand and simplify:

$$\ln\left(\frac{8}{2^x(x^2-3x)}\right)$$

- (a) $8-x\ln 2+\ln x$ (b) $(3-x)\ln 2-\ln x-\ln(x-3)$ (c) $3\ln 2+x+\ln x$

- (d) $\frac{3\ln 2}{2^x(x^2-3x)}$ (e) $(3-x)\ln 2-2\ln x+\ln 3$

7. Solve the following equation for x .

$$11=5+21e^{-2x}$$

- (a) $-\frac{1}{2}\ln\frac{2}{7}$ (b) $-\frac{1}{7}\ln\frac{2}{5}$ (c) $\frac{1}{7}\ln\frac{7}{2}$ (d) $\frac{1}{5}\ln\frac{2}{5}$ (e) $-\frac{1}{5}\ln\frac{2}{5}$

8. Evaluate the following integral:

$$\int \frac{x}{(x^2+2)^3} dx$$

- (a) $\frac{2x^2}{(x^2+2)^4}+C$ (b) $-\frac{1}{4(x^2+2)^2}+C$ (c) $\frac{1}{2}\ln(x^2+2)^3+C$ (d) $-\frac{1}{8(x^2+2)^4}+C$

- (e) $-\frac{1}{2(x^2+2)^2}+C$

9. Solve the following equation for x .

$$\frac{\ln x}{2+3\ln x}=4$$

- (a) $e^{2/3}$ (b) $e^{1/2}$ (c) $e^{3/4}$ (d) $e^{-2/3}$ (e) $e^{-8/11}$

10. The growth of the squid population in a lake is known to be given by the equation

$$P(t) = \frac{A}{1 + e^{-kt}}$$

, where population is measured in millions of squid, time in months and A, k are real constants. If the population at $t=0$ is 50 million, and at the end of one month is 75 million, what is the population at the end of two months?

- (a) 65 million (b) 85 million (c) 100 million (d) 90 million (e) 125 million

11. Let $f(x) = (\ln x)^3 - \ln x^3$. Find $f'(x)$.

- (a) 0 (b) $3(\ln x)^2 - \frac{1}{x^3}$ (c) $\frac{3(\ln x)^2}{x} - \frac{1}{x^3}$ (d) $\frac{3(\ln x)^2}{x} - \frac{3}{x}$ (e) $3(\ln x)^2 - \frac{3}{x}$

12. Let $f(x) = e^{1/x}$. Find the second derivative of $f(x)$ at $x=1$.

- (a) $\frac{4}{3}e$ (b) $2e$ (c) $-2e$ (d) e^2 (e) $3e$

13. Find the largest interval(s) on which $f(x) = e^{-2x^2}$ is concave up.

- (a) $(-\infty, -\frac{1}{2}), (\frac{1}{2}, \infty)$ (b) $(-\frac{1}{2}, \frac{1}{2})$ (c) $(-\infty, \frac{1}{2})$ (d) $(-\frac{1}{2}, \infty)$ (e) $(0, \infty)$

14. Let

$$f(x) = \frac{x + \sqrt{x} - 1}{e^{(x^2)}}$$

Find the equation of the tangent line at $x=1$.

- (a) $y = \frac{1}{2e}x + \frac{3}{2e}$ (b) $y = -\frac{1}{2e}x - \frac{3}{2e}$ (c) $y = -\frac{e}{2}x - \frac{3e}{2}$ (d) $y = \frac{e}{2}x - \frac{3e}{2}$
(e) $y = -\frac{1}{2e}x + \frac{3}{2e}$

15. Find the largest (i.e., absolute maximum) value of $f(x) = x^{3/2}e^{-2x}$ on the interval $0 \leq x \leq 1$.

- (a) $\frac{3\sqrt{3}}{8}e^{-3/2}$ (b) $\frac{3\sqrt{3}}{8}e^{-1}$ (c) 1 (d) e^{-2} (e) $\frac{\sqrt{3}}{8}e^{-3/2}$

