Mat135 Practice Test 2

Part A: Multiple Choice

1. Evaluate $\lim_{x\to 2^-} e^{\frac{1}{x-2}}$

A: 0	B: 1	C: ∞	D: $\sqrt{e}$	E: does not exist

2. The minimum positive value of y = $x+\frac{4}{x}$ occurs at the x-value

A: $\frac{1}{2}$ B: $\frac{1}{2}$ C: 0 D: 2 E: 1

3. Evaluate $\lim_{x\to -1} \frac{|x+1|}{x+1}$.

A: 0	B: 1	C: -1	D: 2	E: does not exist

4. Given that $x^2 + y^2 = 1$, evaluate $\frac{dy}{dx}$ at the point $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$.

A: $\frac{1}{2}$ B: $-\frac{1}{2}$ C: 0 D: -1 E: 1

5. Find the limit of the following $\lim_{x\to\infty}\left(\frac{1-\sqrt{x}}{1+\sqrt{x}}\right)$

A: ∞	B: $-\infty$	C: 1	D: -1	E: D.N.E

6. The length of a rectangle is increasing at 5 cm/min, while its width is decreasing at 4 cm/min. At what rate will the area of the rectangle be changing when its length is 60 cm and its width is 40 cm?

A: 40 cm2/min B: 80 cm2/min C: 60 cm2/min D: 75 cm2/min E: 30 cm2/min

7. Evaluate $\lim_{x\to 0} \frac{e^x - 1}{\cos x}$.

A: ∞	B: $-\infty$	C: 1	D: -1	E: 0

8. If the derivative of y is $y'(x) = (x+2)^2(x-3)(2x+1)^3$ which of the following is false?

(A) y(x) has a local maximum at x = -2
(B) y(x) has a local minimum at x = 3
(C) y(x) increasing at x >3
(D) y(x) is decreasing for –1/2 < x<3
(E) y(x) has maximum at x = -1/2

9. At what point on the curve y = $x\sqrt{x}$ is the tangent line parallel to the line 3x – y + 6 = 0?

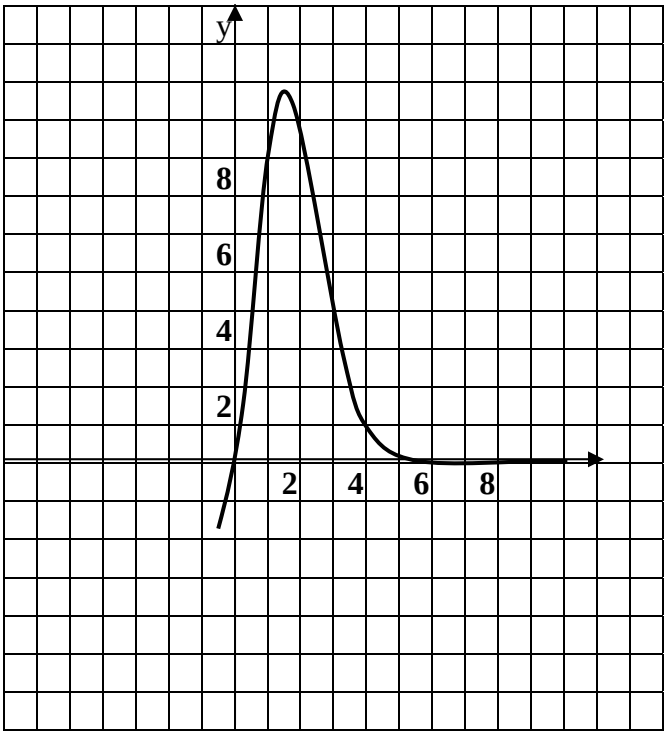
A: $(0, \frac{1}{2})$ B: (0,0), (4,8) C: (0,1) D: (2,-2) E: (1,-2),(0,3)

10. If $x^3 + x\ln y + 3 = 2y + 3e$, then when $x = 1$ and $y = e$, $\frac{dy}{dx} =$

1) $-\frac{e}{1+4e}$
$-\frac{4e}{1-2e}$
3) $-4e$
4) -1
5) $-\frac{2e}{1+2e}$

11. For the graph of the function f(x) given below, which of the following is incorrect?

A: $f'(2) < 0$ B: $f'(0) > 0$ C: $f''(5) < 0$ D: $f''(1.5) < 0$ E: $f'(1) > f'(4)$



12. Suppose F(x) = f(g(x)), f'(3) = 2, f'(6) = 7, g(3) = 6, and g'(3) = 4. Find F'(3).

A: 2	B: 7	C: 4	D: 28	E: 42

13. Evaluate $\lim_{h\to 0} \frac{e^{2+h} - e^2}{h}$.

A: $e^{0.2}$	B: 1.2	C: $e^{-0.2}$	D: e^2	C: 0

14. What is the maximum vertical distance between f(x) = cos x and g(x) = $\sqrt{3}\sin x$ on $0 \le x \le 2\pi$?

A: 1 B: 2 C: π D: 2π E: 3

15. Find y' if y = arctan(cos 3x).

A: $-3\sin 3x\sec 2(\cos 3x)$	B: $\dfrac{-3\sin 3x}{1+\cos^2 3x}$	C: $\dfrac{1+\cos^2 3x}{-3\sin 3x}$
D: $3\csc 2(\cos 3x)\sin 3x$	E: $\dfrac{-3\cos 3x\sin 3x}{1+9x^2}$	

16. Find y' if $x\cos y + y\cos x = 1$.

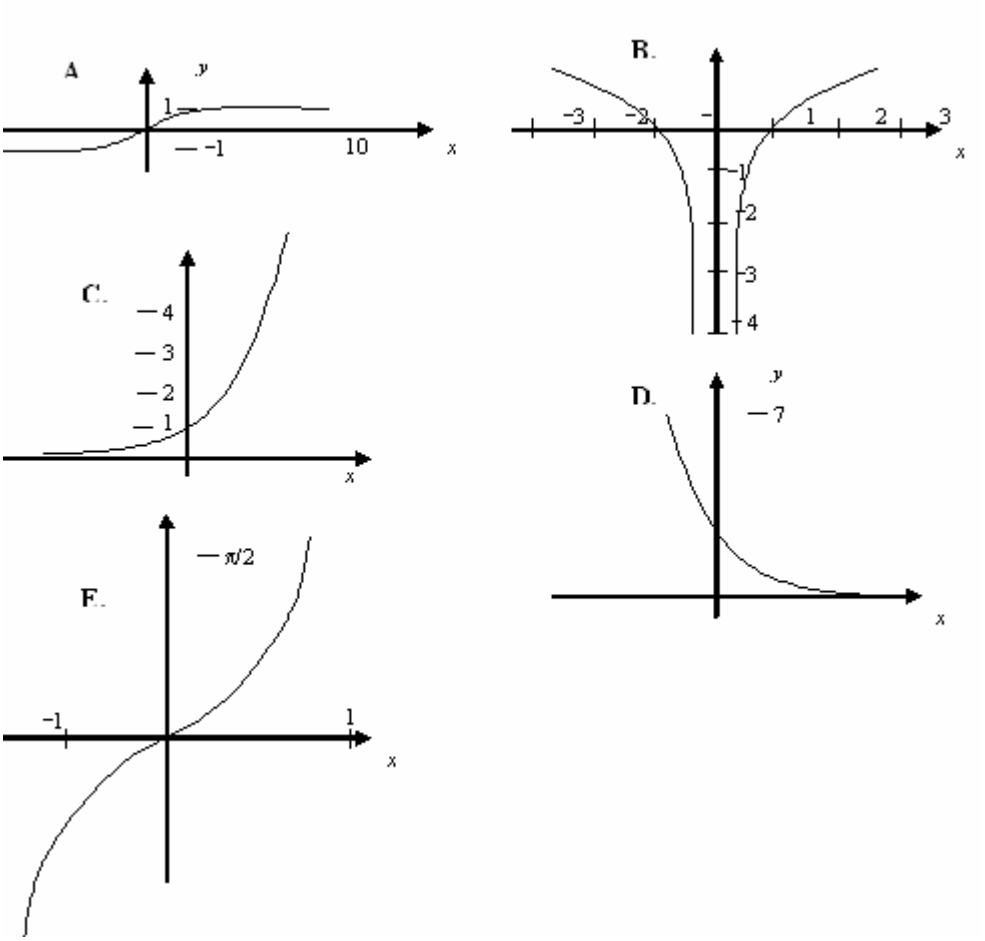
A. $\dfrac{\cos y - y\sin x}{\cos x - x\sin y}$ B. $\dfrac{y\sin x + \cos y}{\cos x + x\sin y}$ C. $\dfrac{y\sin x - \cos y}{\cos x + x\sin y}$

D. $\dfrac{y\sin x - \cos y}{\cos x - x\sin y}$ E. None of the above

17. Find $D^{62}\sin x$.

A: 0 B: $\sin x$ C: $\cos x$ D: $-\sin x$ E: $-\cos x$

For the following questions bellows, choose the letter which labels the graph below.



18. The graph of $y = e^x$ is

A	B	C	D	E

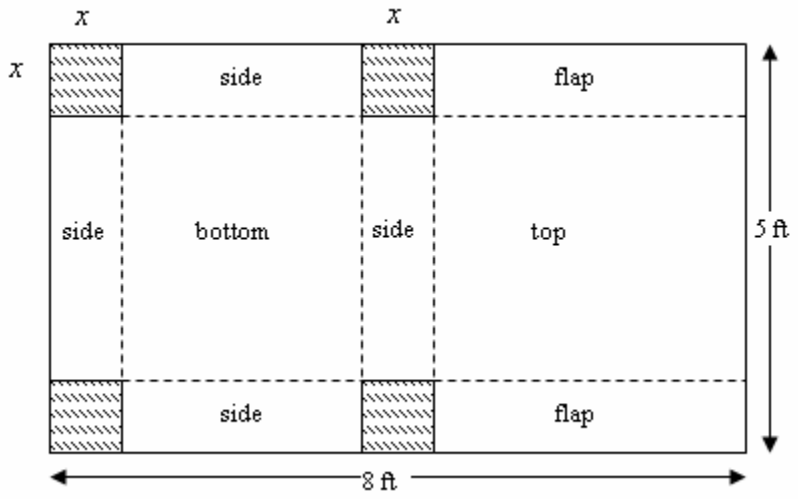
19. The graph of $y = \ln |x|$ is

A	B	C	D	E

Part B: Short Answer

1. A rectangular swimming pool is 8 m wide and 20 m long. Its bottom is a sloping plane, the depth increasing from 1 m at the shallow end to 3 m at the deep end. Water is draining out of the pool at the rate of 1 m^3 / min. How fast is the surface of the water falling when the depth of water at the deep end is (a) 2.5 m? (b) 1 m?

2. Four identical squares are cut out of a 5 ft by 8 ft rectangular sheet of cardboard, as shown in the figure below. The remaining cardboard is folded into a closed rectangular box, with the two extra flaps tucked in. Let *x* be the width of the cut out squares. What value of *x* results in a box with the largest possible volume? Justify your answer.



3. Let $f(x) = \left(x^2 - 3\right)e^{-x^2/2}$. Find all values of x at which $f(x)$ attains a local maximum, and all values of x at which $f(x)$ attains a local minimum. Justify in each case that you have found a local maximum or local minimum.

4. Find the value of the constants a and b such that $\lim_{x \to 0^-} \dfrac{\sqrt{-a|x| + b} - \sqrt{3}}{\sqrt{x+4} - 2} = 4$.

5. The function

$$f(x) = \begin{cases} x^2 & \text{for } 0 \le x \le 2 \\ cx - 4 & \text{for } x > 2 \end{cases}$$

is continuous at $x = 2$.

(a) What is the value of c?

(b) Does $f'(2)$ exist? Justify your answer.

6. Find the derivative of $y = \left(1 + e^x\right)^{\ln x}$.

7. Evaluate $\lim_{x \to \infty} \left(1 + \frac{\ln 3}{x}\right)^{4x} =$