Math 131- Spring 2017- Exam 2

- 6 True/False questions worth 2 points each.
- 12 multiple choice questions worth 4 points each.
- 4 hand graded questions worth 10 points each.
- No notes allowed. You may use one of the approved non-graphing calculators.
- True/False and Multiple Choice: Mark your answer on the answer card in pencil.
- Written: To receive full credit, write up a clear, complete solution, showing all steps.

(see page 222)

or example, let The = X and g(X) = X -

7. Let $f(x) = x \cos(x)$. What is f'(0)?

- (a) π
- (b) -1
- (d)
 - (e) none of the above

$$f'(x) = \cos(x) + x \cdot (-\sin x)$$

 $f'(0) = 1 + 0$

- (a) -3
- (b) -2
- (c) -1
- (d) 0
- (e) 1
- - (h) 6
 - (i) none of the above

11. Suppose $h(x) = \sin(\pi f(x))$ and that f(0) = 1 and f'(0) = 3. What is h'(0)?

(a)
$$-4\pi$$

(b) -3π

 $\rightarrow h'(x) = \cos(\pi f x) \cdot \pi f'(x)$ h'(0) = cos (Tf(0). Tf'(0) = cos(T). T. 7

(d)
$$-\pi$$

- (e) 0
- (f) π
- (g) 2π
- (h) 3π
- (i) 6π
- (i) none of the above

12. Let $f(x) = x^2 + e^{x-2}$. Then P(2,5) is a point on the graph. What is the equation for the tangent line at P?

(a)
$$y = x + 1$$

(b)
$$y = x - 1$$

(c)
$$y = 5$$

(d)
$$y = 2x + e^{x-2}$$

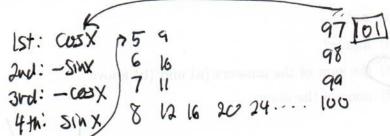
(e)
$$y = 5(x - 1)$$

$$\gamma - 5 = 5(X-2)$$

 $\gamma = 5X-10+5=5X-5$
 $\gamma = 5(X-1)$

15. Let $f(x) = \sin(x)$. Then the 101^{st} derivative $f^{(101)}(x)$ is

- (a) $\sin(x)$
- (b) $\cos(x)$
 - (c) $-\sin(x)$
 - (d) $-\cos(x)$
 - (e) none of the above



 $f'(x) = 2xe^{x^2} = 0 \Rightarrow 2x = 0 \text{ or } e^{x^2} = 0$ $1 = 2xe^{x^2} = 0 \Rightarrow 2x = 0 \text{ or } e^{x^2} = 0$ $1 = 2xe^{x^2} = 0 \Rightarrow 2x = 0 \text{ or } e^{x^2} = 0$ 1 = 0 no solution

16. Let $f(x) = e^{(x^2)}$. For what x does the graph of f have a horizontal tangent line?

- (a) x = -3
- (b) x = -2
- (c) x = -1
- (d) x = 0
 - (e) x = 1
 - (f) x = 2
 - (g) x = 3
 - (h) x = 6
 - (i) none of the above

Written Problem. Clearly show all steps to receive full credit.

- 19. The position of a particle is given by $s = f(t) = t^3 6t^2 + 9t$ where t is in seconds and s is in meters.
 - (a) Find the velocity of the particle as a function of t.

$$V(t) = f'(t) = 3+^2 - 12t + 9$$

(b) Find the acceleration of the particle as a function of t.

$$a(t) = f''(t) = 6t - 12$$

(c) List the time intervals when the particle was moving forward.

Stopped When
$$V(t)=0 \rightarrow 3t^2-12t+9=0$$

 $3(t^2-4t+3)=6$
 $3(t-3)(t-1)=0 \Rightarrow t=1,3$
Possible Intervals $(-\infty,1), (1/3), (3,\infty)$
Check: $f'(0)=9>0$ $f'(2)<0$ $f'(4)>0$

(d) Find the total distance (forward and backward) it moves in the first five seconds. (Note that this is not the same as the position at five seconds.)

distance =
$$|f(1) - f(0)| + |f(3) - f(1)| + |f(5) - f(3)| = |28m|$$

Written Problem. Clearly show all steps to receive full credit.

21. For each function below, find f'(x) using the rules of derivatives. Circle your final answer.

(a)
$$f(x) = 3x^2 - x + 2$$
 $f'(x) = 6x - 1$

$$+2$$
 $f'(x) = 6X-1$

(b)
$$f(x) = 10(x^3 + 9)^{2x}$$

(b)
$$f(x) = 10(x^3 + 9)^{24}$$
 $f(x) = 240(x^3 + 9)^{23}(3x^2) = 720x^2(x^3 + 9)^{23}$

(c)
$$f(x) = \ln(x^3 + 4x + 12)$$

(c)
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$$f'(x) = \frac{3\chi^2 + 4}{\chi^3 + 4\chi + 12}$$

(d)
$$f(x) = \frac{e^x + \sec(x)}{2^x}$$

(d)
$$f(x) = \frac{e^x + \sec(x)}{2^x}$$
 $f'(x) = \frac{e^x + \sec(x)}{2^x} \frac{2^x}{2^x}$ $f'(x) = \frac{e^x + \sec(x)}{2^x}$ $f'(x) = \frac{e^x + \sec(x)}{2^x}$ $f'(x) = \frac{e^x + \sec(x)}{2^x}$ $f'(x) = \frac{e^x + \sec(x)}{2^x}$

(e)
$$f(x) = \tan^{-1}(2x)$$