

112 Practice Test 3

You may use calculators, there will be partial credit for work shown. Take under timed conditions (1 hr)

[10] 1. Let $f(x) = \ln(\sin(\pi x + \frac{\pi}{4}))$

a). Find average rate of change between $a = 0$, and $b = \frac{1}{2}$

b). Find instantaneous rate of change at $a = \frac{1}{2}$

c). Find line tangent to f at $(\frac{1}{2}, \ln(\frac{\sqrt{2}}{2}))$

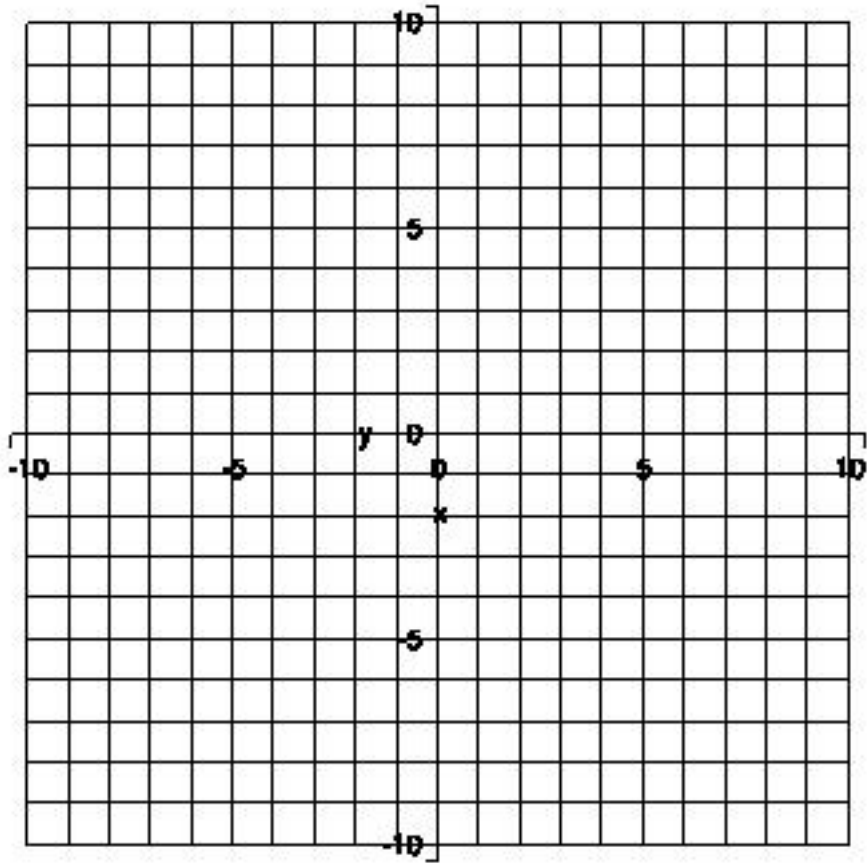
[10] 1. Let $f(x) = e^{x^2} - e^{-x^2}$

a). Find average rate of change between $a = 0$, and $b = 1$

b). Find instantaneous rate of change at $a = 0$

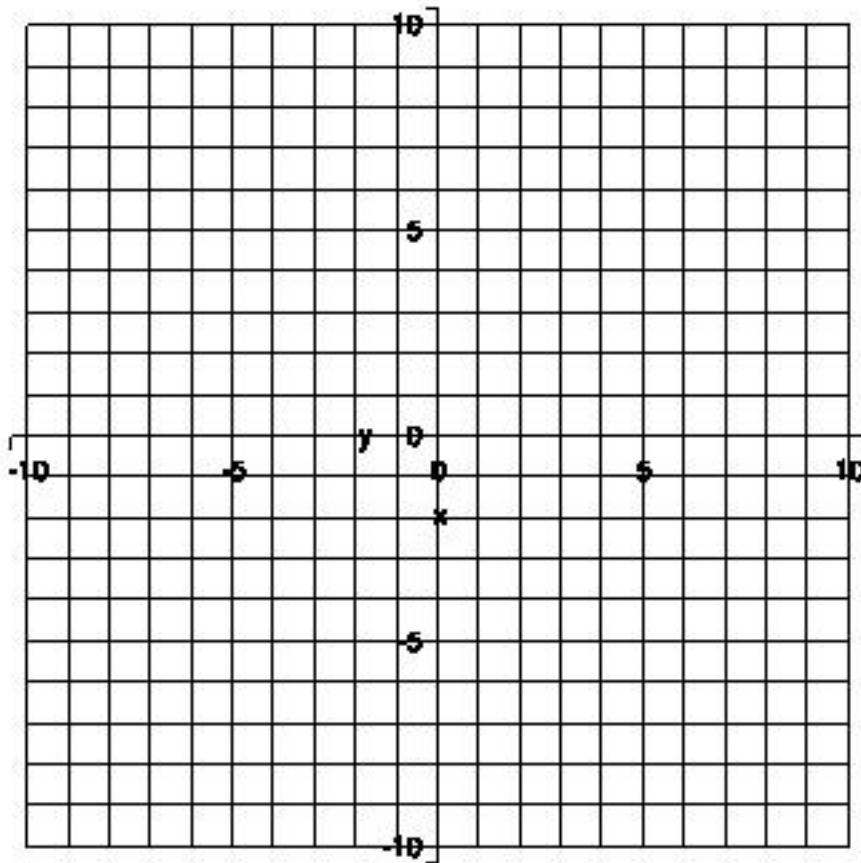
c). Find line tangent to f at $(0,0)$

[5] 2. For $f(x)$ given below



- Graph $f'(x)$
- List (in set notation) points where f is not differentiable
- List (in set notation) points where f is not continuous
- List (in set notation) points where f' is not continuous

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[10] 3. The height of a falling body is given by $h(t) = -32t^2 + 360t + 1000$, find the height when the object starts to fall

[10] 3. Let $f(x) = \frac{1}{3}x^3 - 10x^2 + 30x - 100$, find all local extrema

[10] 4. Consider the following table:

x	f	g	h	f'	g'	h'
-1	Π	0	3	$\frac{1}{2}$	1	2
0	-1	-5	$\frac{\Pi}{4}$	$\frac{1}{4}$	17	$2e$
1	$\sqrt{2}$	-6	9	$\frac{1}{8}$	4Π	122

a). Find $\frac{d}{dx}(f(x) + g(x))$ at $x = 1$

b). Find $\frac{d}{dx}(f(g(x)))$ at $x = -1$

c). Find $\frac{d}{dx}(\cos(f(x)))$ at $x = -1$

d). Find $\frac{d}{dx}(e^h(x))$ at $x = 0$

e). Find $\frac{d}{dx}(h(g(x)))$ at $x = 1$

f). Find $\frac{d}{dx}(f(x) - h(x)g(x))$ at $x = 0$

g). Find $\frac{d}{dx}(\ln((f(x))^2))$ at $x = 1$

[10] 5. Let $f(x) = \frac{1}{12}x^4 + \frac{1}{6}x^3 - 3x^2 + 17x - 122q$ find intervals for when $f(x)$ is concave down.

[10] 5. Let $f(x) = \frac{1}{16}x^4 - \frac{1}{9}x^3 + 10x^2 + a\sqrt{\Pi}x - 122a^2\Pi$ find intervals for when $f(x)$ is concave up.

[5] 7. Let $y = f(x)$, find $\frac{dy}{dx}$ if $y^3 \sqrt[3]{x^2} - e^{y^2} = xy$

[5] 7. Let $y = f(x)$, find $\frac{dy}{dx}$ if $\frac{x}{y} - y^2 = \ln y$

[5] 7. Let $y = f(x)$, find $\frac{dy}{dx}$ if $(x + y)^2 + \sin(y) = (xy)^3$

[5] 7. Let $y = f(x)$, find $\frac{dy}{dx}$ if $\tan(y)\cos(x) + e^{xy} = \tan(xy^2)$