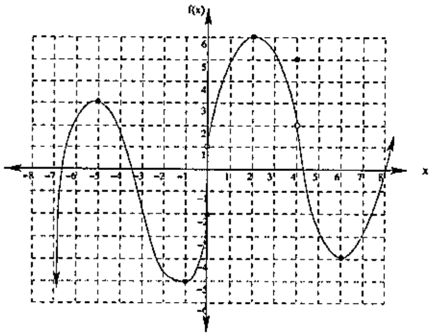
60–65 ⇒ 10
54–59 ⇒ 9
47–53 ⇒ 8
41–46 ⇒ 7
34–40 ⇒ 6

21–27 ⇒ 4

Math 262 Calculus II Lab 1 Calc I Derivatives Review Name: KEY

1. A function f is graphed below.



(a) Find $f(-5)$, $f(0)$, and $f(4)$

$f(-5) = 3$
$f(0) = -2$
$f(4) = 5$

3

(b) Find the domain and range of f

domain is $(-7, \infty)$
range is $(-\infty, \infty)$

2

(c) Find the intervals where $f'(x)$ is positive

$(-7, -5)$
$(-1, 0)$
$(0, 2)$
$(6, \infty)$

3

(d) Find the intervals where $f''(x)$ is negative.

$(-7, -3)$
$(0, 4)$

3

(e) Find $\lim_{x\to 4} f(x)$

$= 2$

2

(f) Find $\lim_{x\to 0^+} f(x)$ $= 1$

2

(g) Find $\lim_{x\to -7} f(x)$

DNE

2

17

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2. Evaluate each of the following. You do not need to simplify your answers.

(a) $\frac{d}{dx}\left[4\sqrt{x} - \frac{2}{\sqrt{x}} + 5\right]$

$= 4\cdot\frac{1}{2}x^{-\frac{1}{2}} - 2\left(-\frac{1}{2}\right)x^{-\frac{3}{2}}$

$= \frac{2}{\sqrt{x}} + \frac{1}{x\sqrt{x}}$

(d) $\frac{d}{dt}\left(\frac{8t+15}{1-\cos(t)}\right)$

$= \frac{8(1-\cos(t)) - \sin(t)(8t+15)}{(1-\cos(t))^2}$

6 each ⇒ 24

(b) $\frac{d}{dx}\left(\frac{2x+3}{\sqrt{x^3}}\right)$

$= \frac{2\sqrt{x^3} - \frac{3}{2}\sqrt{x}(2x+3)}{x^3}$

$= \frac{4x\sqrt{x} - 6x\sqrt{x} - 9\sqrt{x}}{2x^3}$

$= \frac{-2x\sqrt{x} - 9\sqrt{x}}{2x^3}$

(e) $\frac{d}{dx}\left((8x-1)(x^2-3x+2)(x+5)\right)$

$= 8(x^2-3x+2)(x+5)$
$+ (2x-3)(8x-1)(x+5)$
$+ 1(8x-1)(x^2-3x+2)$
$= 8x^3 + 16x^2 - 104x + 80$
$+ 16x^3 + 54x^2 - 127x + 15$
$+ 8x^3 - 25x^2 + 19x - 2$
$= 32x^3 + 45x^2 - 212x + 93$

(2x-3) (8x^2+3...

(c) $\frac{d}{dx}(x^3\sin(x))$

$= 3x^2\sin x + x^3\cos(x)$

(f) $\frac{d^2}{dx^2}\left(\sqrt{2x^2+x-1}\right)$

$= \frac{d}{dx}\left(\frac{1}{2}(4x+1)(2x^2+x-1)^{-\frac{1}{2}}\right)$ +2

$= \frac{1}{2}(4)(2x^2+x-1)^{-\frac{1}{2}} - \frac{1}{4}(4x+1)^2(2x^2+x-1)$

$= \frac{2}{\sqrt{2x^2+x-1}} - \frac{(4x+1)^2}{4(2x^2+x-1)^{3/2}}$

$= \frac{-9}{4(2x^2+x-1)^{3/2}}$

36

(g) $\frac{d}{dx}\left(x\sqrt{25-x^2}\right)$

$$= \sqrt{25-x^2} - \frac{2x^2}{2}(25-x^2)^{-\frac{1}{2}}$$

$$= \frac{25-x^2-x^2}{\sqrt{25-x^2}}$$

$$= \frac{25-2x^2}{\sqrt{25-x^2}}$$

(i) $\frac{d^3}{dx^3}(\tan(x))$

$$= \frac{d^2}{dx^2}(\sec^2 x)$$

$$= \frac{d}{dx}(2\sec^2 x \tan x)$$

$$= 4\sec^2 x \tan^2 x + 2\sec^4 x$$

In class in full
→ not graded

6 each
⇒ 18

(h) $\frac{d}{dx}\left(\frac{3x\cos(x)}{2+x^2}\right)$

$$= \frac{(3\cos x - 3x\sin x)(2+x^2) - 2x(3x\cos x)}{(2+x^2)^2}$$

18

3. Find $\frac{dy}{dx}$ for an implicit function defined by the equation $x^2 - xy + y^2 = 4$

$$2x - y - x\frac{dy}{dx} + 2y\frac{dy}{dx} = 0$$

$$\left(\frac{dy}{dx}\right)(-x+2y) = y - 2x$$

$$\frac{dy}{dx} = \frac{y-2x}{2y-x}$$

In class
to

→ not graded

4. Find an equation of the tangent line to the graph of $f(x) = \tan(2x)$ when $x = \frac{\pi}{8}$

$$f'(x) = 2\sec^2(2x)$$

$$f\left(\tfrac{\pi}{8}\right) = \tan\left(\tfrac{\pi}{4}\right) = 1$$

$$m = f'\left(\tfrac{\pi}{8}\right) = 2\sec^2\left(\tfrac{\pi}{4}\right) = 2(\sqrt{2})^2 = 4$$

$$y - 1 = 4\left(x - \tfrac{\pi}{8}\right)$$

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