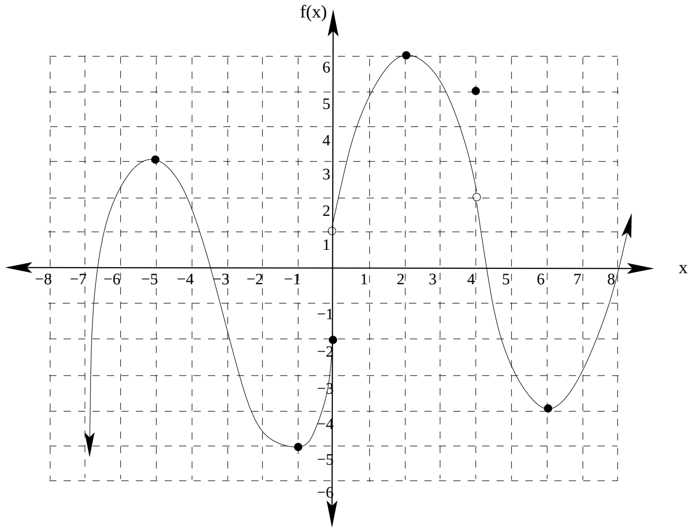
Math 262 Calculus II Lab 1 Calculus I Review Name: ____________________

1. A function f is graphed below.



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

(b) Find the domain and range of f

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

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

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

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

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

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

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

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

(c) $\dfrac{d}{dx}\left(x^3 \sin(x)\right)$

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

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

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

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

(h) $\dfrac{d^3}{dx^3}\left(\tan(x)\right)$

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

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

5. Evaluate each of the following:

(a) $\displaystyle\int (3t-4)^5 \, dt$

(b) $\displaystyle\int_{\frac{\pi}{6}}^{\frac{2\pi}{3}} \sin(x) \, dx$

(c) $\displaystyle\int \tan^2(x)\sec^2(x) \, dx$

(d) $\displaystyle\int \frac{x^4-2x^3}{x^2} \, dx$

(e) $\displaystyle\int_0^1 \left(4x^3-7x^2+3x-2\right) x \, dx$

(f) $\displaystyle\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \sin^4(x)\cos(x) \, dx$

(g) $\displaystyle\int_{-2}^{3} (2x-5)(3x+1)\ dx$

(h) $\displaystyle\int_{13}^{20} x\sqrt{x^2-144}\, dx$

6. Use the Fundamental Theorem of Calculus to evaluate each of the following:

(a) $\displaystyle\int \frac{d}{dx}\left(\sin\left(\sqrt[3]{x}\right)\right)\ dx$

(b) $\displaystyle\frac{d}{dx}\int \tan\left(x^2+1\right)\ dx$

(c) $\displaystyle\frac{d}{dx}\int_0^{\frac{\pi}{4}} \frac{\sin\left(3x^2\right)}{\cos\left(2x\right)}\ dx$

7. Find the area of the bounded region between the curves $y = 4\sqrt{x}$ and $y = (x-1)^2 - 1$.